COUNTY OF LOS ANGELES

SUSTAINABLE INFRASTRUCTURE GUIDELINES

AECOM

Final June 2017

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Executive Summary

The Los Angeles County (the County) Sustainable Infrastructure Guidelines (SIG) represent a significant step toward implementing sustainable, resilient infrastructure for the Department of Public Works (DPW). The SIG were developed with input from staff from several divisions within DPW through a series of workshops. The SIG were drafted following these key principles (identified in DPW workshops):

- Minimize impact on resources such as energy and water
- Target strategies that can be effectively implemented
- Complement, but do not duplicate, existing sustainability programs such as Leadership in Energy and Environmental Design (LEED), Envision Rating System (Envision), and SITES Rating System (SITES)
- Minimize long-term operating costs
- Consider cost/benefit relationships of all strategies to ensure cost effectiveness
- Minimize maintenance requirements

The SIG are developed primarily for County DPW projects. A number of exemptions to projects may apply (as listed in the Implementation section). The SIG are structured into two major sections: 1) Infrastructure Sustainability Strategies and 2) Small Buildings Sustainability Strategies (for buildings less than 10,000 square feet [SF]).

Within the Infrastructure Sustainability Strategies section, the guidelines have been organized by: Categories, Strategies, and Action Items. The following categories have been identified:

- Integrative Design
- Site
- Water
- Energy
- Materials
- Climate Mitigation and Resilience
- Construction
- Operations and Maintenance

All these categories include strategies for meeting the guidelines, which are further simplified into action items with the following three components:

- A check (✓) to indicate if the action is required or not
- A method to document the action (e.g., narrative or plans, drawings or specifications, or calculations)
- References such as Envision credits, SITES credits, and/or other guiding documents

The Small Buildings Sustainability Strategies section has been developed to complement existing County and State codes such as Title 24. Additional California Green Building Standards Code (CALGreen) Tier 1 measures have been identified along with a handful of DPW-specific strategies to further encourage best management building practices.

A series of templates for application of the SIG are provided to assist with planning, design, and implementation. The templates will also be able to score a project based on the Envision system to evaluate approximately how many potential Envision credits would be achieved (if the project team ultimately decides to pursue Envision certification).

With effective implementation, the DPW is positioned to minimize long-term operating costs while minimizing impact on natural resources. The SIG are one of the first of its kind in the United States and will position the County as a leader of sustainable and resilient infrastructure projects.

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Acronyms and Abbreviations

ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
BIA	Business Industry Association
BMP	Best Management Practice
C	Construction
CAAQS	California Ambient Air Quality Standards
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CASQA	California Stormwater Quality Association
CCPR	Cold Central Plant Recycling
CEQA	California Environmental Quality Act
CIPR	Cold in Place Recycling
CMB	Crushed Miscellaneous Base
County	Los Angeles County
CR	Climate Mitigation and Resilience
CSPB	Cement Stabilized Pulverized Base
CZ	Climate Zone
DOT	U.S. Department of Transportation
DPW	Department of Public Works
E	Energy
ECM	Energy Conservation Measure
EESPB	Engineered Emulsion Stabilized Pulverized Base
Envision	Envision Rating System
EPA	U.S. Environmental Protection Agency
EPD	Environmental Programs Division
EV	Electric Vehicle
FHWA	Federal Highway Administration
FMD	Flood Maintenance Division
ft	Foot/Feet
GHG	Greenhouse Gas
GIB	Green Infrastructure and Buildings
GSA	General Services Administration
HCFC	Hydrochlorofluorocarbon
HHWB	Human Health + Well-Being
HVAC	Heating, Ventilation, and Air Conditioning
ID	Integrative Design
IDW	Integrative Design Worksheet
IES	Illuminating Engineering Society
LA	Los Angeles
LCA	Lighting Controls Association
LD	Leadership
LED	Light-Emitting Diode

LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
M	Materials
MERV	Minimum Efficiency Reporting Value
MMRP	Mitigation Monitoring and Reporting Program
MR	Materials and Resources
ND	Neighborhood Development
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NPD	Neighborhood Pattern and Design
NW	Natural World
OM	Operations and Maintenance
PCI	Pavement Condition Index
PCR	Project Concept Report
PDC	Project Design Concept
PMCM	Project Management/Construction Management
PV	Photovoltaic
QL	Quality of Life
RA	Resource Allocation
ROI	Return on Investment
S	Site
SB	Small Buildings
SCAQMD	South Coast Air Quality Management District
SCM	Supplementary Cementitious Material
SF	Square Feet
SIG	Sustainable Infrastructure Guidelines
SITES	Sites Rating System
SLL	Smart Location and Linkage
SNAP	Significant New Alternatives Policy
SRI	Solar Reflectance Index
SWPPP	Stormwater Pollution Prevention Plan
SWQDv	Stormwater Quality Design Volume
TOD	Transit-Oriented Development
VOC	Volatile Organic Compound
W	Water
WARM	Waste Reduction Model
WE	Water Efficiency
WRD	Water Resources Division

Introduction

The Los Angeles County (the County) Department of Public Works (DPW) has developed Sustainable Infrastructure Guidelines (SIG) that provide a framework for project teams to successfully implement sustainable design on all County DPW infrastructure projects. Currently, there is limited guidance for integrating sustainable practices in DPW infrastructure projects, with the exceptions of Low Impact Development (LID) requirements and the Envision Rating System (Envision). In August 2016, the "Los Angeles County Board of Supervisors directed the Director of Public Works, the new Chief Sustainability Officer, and the CEO to expand and adopt the use of Envision for County infrastructure projects; to reach out and engage with construction and small business community to assist them with implementation; and to coordinate with cities and public agencies within the County that may be interested in adopting the Envision framework"(Institute for Sustainable Infrastructure). DPW building projects greater than 10,000 square feet (SF) are required to be Leadership in Energy and Environmental Design (LEED) Gold certified. However, there are no requirements for buildings less than 10,000 SF, other than the State-mandated codes.

This County SIG document addresses a number of project types to ensure the County provides guidance to plan, design, and construct infrastructure and building projects. This document provides additional resources for broader sustainability applications. The SIG were developed with input from staff from several divisions within DPW through a series of workshops. The SIG were drafted following these key principles (identified in DPW workshops):

- Minimize impact on resources such as energy and water
- Target strategies that can be effectively implemented
- Complement, but do not duplicate, existing sustainability programs such as Leadership in Energy and Environmental Design (LEED), Envision Rating System (Envision), and SITES Rating System (SITES)
- Minimize long-term operating costs
- Consider cost/benefit relationships of all strategies to ensure cost effectiveness
- Minimize maintenance requirements

The SIG are developed primarily for County DPW projects. A number of exemptions to projects may apply (as listed in the Implementation section). The SIG are structured into two major sections: 1) Infrastructure Sustainability Strategies and 2) Small Buildings Sustainability Strategies (for buildings less than 10,000 SF).

Within the Infrastructure Sustainability Strategies section, the guidelines have been organized by:

Category
- ► Strategy
  - ► Action Item

The following Infrastructure categories have been identified: Integrative Design, Site, Water, Energy, Materials, Climate Mitigation and Resilience, Construction, and Operations and Maintenance. All these categories include strategies for meeting the guidelines, which are further simplified into action items with the following three components:

- A check (✓) to indicate if the action is required or not
- A method to document the action (e.g., narrative or plans, drawings or specifications, or calculations)
- References such as Envision credits, SITES credits, and/or other guiding documents

The Small Buildings Sustainability Strategies section has been developed to complement existing County and State codes such as Title 24. Additional California Green Building Standards Code (CALGreen) Tier 1 measures have been identified along with a handful of DPW-specific strategies to further encourage best management building practices. As Title 24 continues to become more aggressive with regard to energy conservation, the SIG will adapt and respond accordingly. The action items have been carefully vetted with the SIG building working group to ensure the program is effective, implementable, and cost effective.

The County is raising the bar with its commitment to reduce operating expenses while contributing to a sustainable and resilient future. The SIG are one of the first of its kind in the United States and will position the County as a leader of sustainable infrastructure projects.

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County of Los Angeles Sustainable Infrastructure Guidelines Strategy List

CATEGORIES	STRATEGIES			
 Integrative Design	☐ ID1	Hold Sustainability Kick-Off Meeting	☐ ID4	Incorporate Sustainability Awareness
	☐ ID2	Promote Stakeholder Engagement	☐ ID5	Integrative Design Innovation
	☐ ID3	Incorporate Complete Streets		
 Site	☐ S1	Incorporate Smart Master Planning	☐ S5	Optimize Landscape Design
	☐ S2	Maximize Site Access and Circulation	☐ S6	Optimize Hardscape Design
	☐ S3	Incorporate Environmental Mitigation	☐ S7	Optimize Smart Irrigation
	☐ S4	Incorporate Low Impact Development and Erosion Control	☐ S8	Site Innovation
 Water	☐ W1	Improve Water Quality	☐ W4	Optimize Stormwater Reuse
	☐ W2	Restore Natural Hydrology	☐ W5	Reduce Potable Water Consumption
	☐ W3	Reduce Flooding	☐ W6	Water Innovation
 Energy	☐ E1	Minimize Light Pollution	☐ E5	Incorporate Renewable/Alternative Energy
	☐ E2	Reduce Energy Consumption	☐ E6	Optimize Traffic Signals Systems
	☐ E3	Incorporate Energy Sub-Metering	☐ E7	Optimize Street Lighting
	☐ E4	Commission Energy Systems	☐ E8	Energy Innovation
 Materials	☐ M1	Use Durable Materials	☐ M4	Reuse Materials on Project Site
	☐ M2	Reduce Air Pollutants	☐ M5	Provide for Deconstruction and Recycling
	☐ M3	Enhance Pavement Life-Cycle	☐ M6	Materials Innovation
 Climate Mitigation and Resilience	☐ CR1	Identify GHG Emissions Reductions	☐ CR3	Design for a Changing Climate
	☐ CR2	Identify Climate Vulnerabilities	☐ CR4	Climate Mitigation and Resilience Innovation
 Construction	☐ C1	Minimize Pollution from Construction Activity	☐ C6	Reduce Air Pollutants
	☐ C2	Manage Waste and Recycling	☐ C7	Incorporate Climate and Risk into Construction Plans
	☐ C3	Minimize Trucking	☐ C8	Minimize Resource Consumption during Construction
	☐ C4	Protect Existing Natural Systems	☐ C9	Construction Innovation
	☐ C5	Reduce Noise and Vibration		
 Operations and Maintenance	☐ OM1	Plan for Long-Term Monitoring and Maintenance	☐ OM5	Reduce Pesticides and Fertilizers
	☐ OM2	Promote Preventative Maintenance	☐ OM6	Reduce Air Pollutants
	☐ OM3	Establish Asset Class Performance and Maintenance	☐ OM7	Operation and Maintenance Innovation
	☐ OM4	Establish Funding		
 Small Buildings	☐ SB1	Comply with County Green Building Standards Code	☐ SB3	Achieve DPW-Specific Actions
	☐ SB2	Achieve Targeted CALGreen Tier 1 Measures	☐ SB4	Small Buildings Innovation

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Implementation

Applicability

The SIG were developed for the DPW to guide design teams in implementing best management practices (BMPs) for infrastructure and small building projects.

All projects designed within the DPW (often referred to as in-house projects) are required to comply with these guidelines to the maximum extent practicable. This includes new construction and renovations.

As discussed in the Introduction, the SIG are organized into Categories, Strategies, and Action Items. Within each category are strategies, and within each strategy are actions items that are either required or optional. A Project Type Applicability Matrix was developed (included on page 13) that defines which strategies are applicable for each project type. These guidelines were developed accounting for environmental, economic, and social benefits. Where feasible, the recommendations align with and support existing codes, initiatives, and sustainable performance rating systems. For example, the infrastructure strategies align with Envision, and the building strategies align with CALGreen.

These guidelines were developed through extensive collaboration with various divisions within the DPW. Several workshops were held to discuss strategies, references, case studies, and implementation. Further, the guidelines were piloted on two projects: Roosevelt Park Regional Stormwater Capture Project and Stoneview Nature Center. These guidelines will be periodically updated by the DPW.

All projects are unique and it is understood that not every project will be able to fully comply with the SIG. In general, the following project categories have been identified as ones which may not fully comply with the SIG. The maximum extent to which the SIG is applied will be determined by the Project Manager and should be discussed in the applicable section of the project concept document (PCR, PDC, or equivalent) as described in the Implementation Workflow below.

Infrastructure Projects	• Project sites less than 10,000 SF (site area should be defined according to the LID Standards Manual DPW 2014, Section 1.6 Applicability of the LID Standards Manual-Street and Road Construction) with the exception of LID requirements • Projects below $100,000 (design + construction) • Projects approved prior to the adoption of the SIG • Emergency repair/disaster response projects • Seismic Retrofit projects
Small Building Projects	• New construction and additions/alterations for buildings/structures less than 1,000 SF • Additions/alterations with permit valuation below $200,000 • Projects approved prior to the adoption of the SIG • Temporary structures (those erected for less than 5 years) • Emergency repair/disaster response projects • Designated Historical Buildings • Seismic Retrofit projects

Compatibility with Envision

As the application of Envision continues to be expanded within the department, the SIG have been developed to complement Envision. Although all SIG strategies are specific to LA County, they address every Envision credit. The SIG compliance documentation can also be used to support an Envision certification application. An analysis was completed to determine that achievement of all required SIG credits equates to an approximate Envision rating equivalency of Bronze. It is intended that project teams pursue additional strategies, based on specific scope, to reach an Envision equivalency of Silver.

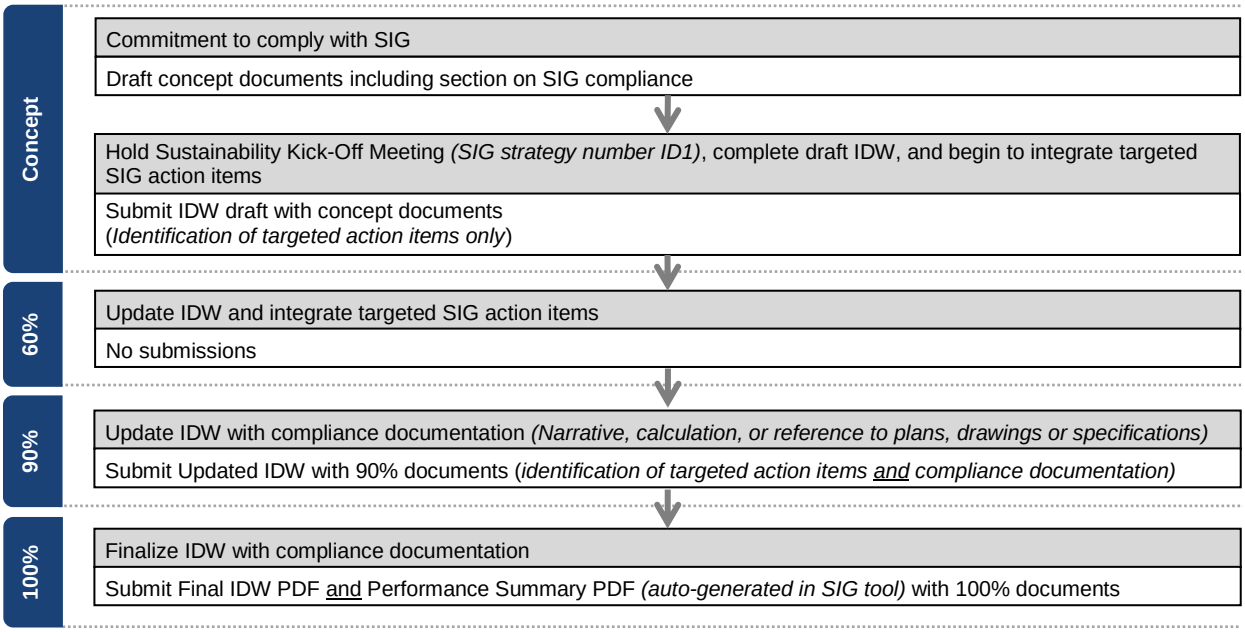
Project Type Applicability Matrix

The matrix following on page 13 summarizes the key infrastructure project types and their applicability to each sustainability strategy. This matrix does not imply that the strategy is required. Due to the diverse nature of DPW projects and the fact that each project is unique in its scope and site, all strategies and the action items need to be reviewed for applicability. In addition, some projects may include multiple disciplines or infrastructure, so a project type called “Other” has been included in the applicability matrix.

Worksheets

Integrative Design Worksheets (IDWs) were developed for infrastructure projects and small buildings as tools to support the planning, design, and implementation process (see Appendixes A and B). These worksheets include references to Envision credits and CALGreen measures, and auto-generate a summary of overall project performance.

Implementation Workflow and Submission Requirements



Applicability Matrix for Infrastructure Projects

	STRATEGY	WATER								ROAD					TRAFFIC & LIGHTING			MECHANI-CAL		STRUCTURES				LAND-SCAPE	
		Storm Drains and Channels (new)	Storm Drains and Channels (modifications and repairs)	Debris Basins and Dams (new and enlargements)	Debris Basins and Dams (cleanouts and modifications)	Seawater Barrier Facilities	Spreading Grounds and Sediment Placement Sites	Water Quality and Infiltration Improvements	Multi-Benefit Improvements	Reconstruction, Widening, New Roadway	Resurfacing, Rehabilitation, Preventative Maintenance	Complete/Green Streets, Parkway Improvements	New Class I Bike Path, Cycle Track, Bike Boulevard	Misc. Road, Site, Traffic Calming, and Pedestrian Improvements	Traffic Signals	Striping and Signing	Street Lighting	Dam, Pump Station, and Seawater Barriers Mechanical Improvements	Misc. Mechanical	Bridge (New or Replacement)	Bridge (Preservation, Preventative Maintenance, Retrofit)	Retaining Walls	Misc. Structural Improvements	Landscape/Hardscape	Other
Integrative Design	ID1 Hold Sustainability Kick-Off Meeting	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	ID2 Promote Stakeholder Engagement	●		●	●	●	●	●	●	●		●	●	●	●	●	●			●	●	●		●	●
	ID3 Incorporate Complete Streets								●	●		●	●	●	●	●				●				●	●
	ID4 Incorporate Sustainability Awareness			●			●	●	●			●	●	●						●				●	●
	ID5 Integrative Design Innovation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Site	S1: Incorporate Smart Master Planning			●			●		●	●		●	●	●	●	●	●			●		●		●	●
	S2: Maximize Site Access and Circulation								●	●		●	●	●	●	●	●			●				●	●
	S3: Incorporate Environmental Mitigation	●	●	●	●	●	●	●	●	●		●	●	●			●	●		●		●	●	●	●
	S4: Incorporate Low Impact Development and Erosion Control	●		●	●	●	●	●	●	●		●	●	●						●				●	●
	S5: Optimize Landscape Design							●	●	●		●	●	●										●	●
	S6: Optimize Hardscape Design							●	●	●		●	●	●						●				●	●
	S7: Optimize Smart Irrigation			●			●		●			●										●		●	●
	S8: Site Innovation	●		●	●	●	●	●	●	●		●	●	●	●	●	●			●		●		●	●
Water	W1: Improve Water Quality	●					●	●	●	●		●	●	●						●				●	●
	W2: Restore Natural Hydrology	●		●			●	●	●	●		●								●				●	●
	W3: Reduce Flooding	●	●	●	●		●	●	●	●	●	●							●	●				●	●
	W4: Optimize Stormwater Reuse	●		●	●		●	●	●	●		●								●				●	●
	W5: Reduce Potable Water Consumption							●	●	●		●						●	●					●	●
	W6: Water Innovation			●				●	●	●		●						●	●	●				●	●
Energy	E1: Minimize Light Pollution								●			●					●	●	●	●				●	●
	E2: Reduce Energy Consumption											●	●	●	●		●	●	●					●	●
	E3: Incorporate Energy Sub-Metering			●													●	●	●					●	●
	E4: Commission Energy Systems																	●	●						●
	E5: Incorporate Renewable/Alternative Energy			●		●			●			●	●	●	●		●	●	●						●
	E6: Optimize Traffic Signals Systems														●										●
	E7: Optimize Street Lighting									●							●								●
	E8: Energy Innovation			●					●			●			●		●	●	●						●
Materials	M1: Use Durable Materials	●	●	●		●			●	●	●	●	●	●						●	●			●	●
	M2: Reduce Air Pollutants									●	●		●			●		●	●	●	●			●	●
	M3: Enhance Pavement Life-Cycle									●	●	●	●	●											●
	M4: Reuse Materials on Project Site	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●		●	●
	M5: Provide for Deconstruction and Recycling	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●		●		●	●
	M6: Materials Innovation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Climate Mitigation & Resilience	CR1: Identify GHG Emissions Reductions						●	●	●	●	●	●	●	●	●			●	●					●	●
	CR2: Identify Climate Vulnerabilities	●		●	●		●		●	●		●	●					●		●		●			●
	CR3: Design for a Changing Climate	●		●	●		●		●	●		●	●					●		●		●		●	●
	CR4: Climate Mitigation and Resilience	●		●			●			●										●		●			●
Construction	C1: Minimize Pollution from Construction Activity				●																				●
	C2: Manage Waste and Recycling	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	C3: Minimize Trucking	●	●	●	●	●	●		●	●	●	●	●	●						●	●	●		●	●
	C4: Protect Existing Natural Systems	●	●	●	●	●	●		●	●		●	●	●						●		●		●	●
	C5: Reduce Noise and Vibration	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●	●	●	●	●	●	●
	C6: Reduce Air Pollutants	●	●	●	●		●	●	●	●	●	●	●	●						●	●	●			●
	C7: Incorporate Climate and Risk into Construction Plans		●	●	●													●		●		●	●		●
	C8: Minimize Resource Consumption during Construction	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	C9: Construction Innovation			●	●					●										●		●			●
Operations and Maintenance	OM1: Plan for Long-Term Monitoring and Maintenance	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●		●		●	●
	OM2: Promote Preventative Maintenance	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	OM3: Establish Asset Class Performance and Maintenance	●	●							●															●
	OM4: Establish Funding	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●
	OM5: Reduce Pesticides and Fertilizers						●		●			●												●	●
	OM6: Reduce Air Pollutants																	●	●						●
	OM7: Operation and Maintenance Innovation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Infrastructure Performance Summary

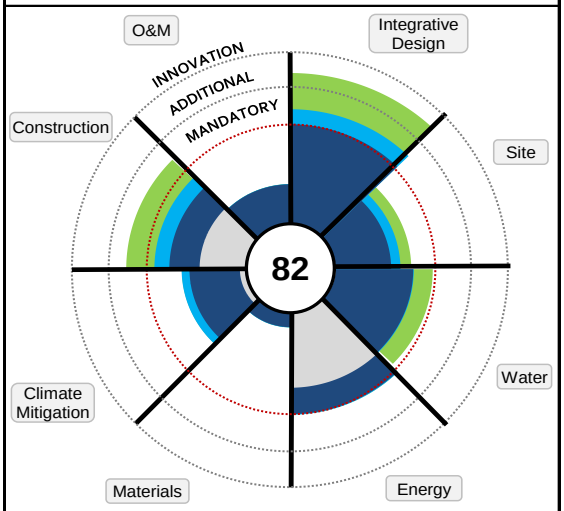
Project Name:		**Date:**	
Project Type:		**Project ID:**	
Project Manager:			
Design phase submission:			
Completed by (include email):		**Email:**	

☐ Exempt ☐ Unable to comply

If any of the above selected, provide supporting narrative here

	Strategies	Achieved		
		Y	N	NA
Integrative Design	ID1: Hold Sustainability Kick-Off Meeting	X		
	ID2: Promote Stakeholder Engagement	X		
	ID3: Incorporate Complete Streets	X		
	ID4: Incorporate Sustainability Awareness	X		
	ID5: Integrative Design Innovation	X		
Site	S1: Incorporate Smart Master Planning		X	
	S2: Maximize Site Access and Circulation		X	
	S3: Incorporate Environmental Mitigation	X		
	S4: Incorporate LID and Erosion Control	X		
	S5: Optimize Landscape Design	X		
	S6: Optimize Hardscape Design	X		
	S7: Optimize Smart Irrigation		X	
	S8: Site Innovation	X		
Water	W1: Improve Water Quality	X		
	W2: Restore Natural Hydrology	X		
	W3: Reduce Flooding		X	
	W4: Optimize Stormwater Reuse		X	
	W5: Reduce Potable Water Consumption		X	
	W6: Water Innovation	X		
Energy	E1: Minimize Light Pollution			X
	E2: Reduce Energy Consumption			X
	E3: Incorporate Energy Sub-Metering			X
	E4: Commission Energy Systems			X
	E5: Incorporate Renewable/Alternative Energy		X	
	E6: Optimize Traffic Signals Systems	X		
	E7: Optimize Street Lighting			X
	E8: Energy Innovation		X	
Materials	M1: Use Durable Materials		X	
	M2: Reduce Air Pollutants	X		
	M3: Enhance Pavement Lifecycle			X
	M4: Reuse Materials on Project Site		X	
	M5: Provide for Deconstruction and Recycling		X	
	M6: Materials Innovation		X	
Climate Mitigation & Resilience	CR1: Identify GHG Emissions Reductions	X		
	CR2: Identify Climate Vulnerabilities		X	
	CR3: Design for a Changing Climate			X
	CR4: Climate Mitigation and Resilience Innovation		X	
Construction	C1: Minimize Pollution from Construction Activity		X	
	C2: Manage Waste and Recycling	X		
	C3: Minimize Trucking	X		
	C4: Protect Existing Natural Systems	X		
	C5: Reduce Noise and Vibration	X		
	C6: Reduce Air Pollutants		X	
	C7: Incorporate Climate & Risk into Construction Plans	X		
	C8: Minimize Resource Consumption during Construction	X		
	C9: Construction Innovation	X		
Operations and Maintenance	OM1: Plan for Long-Term Monitoring and Maintenance		X	
	OM2: Promote Preventative Maintenance		X	
	OM3: Establish Asset Class Performance & Maintenance		X	
	OM4: Establish Funding	X		
	OM5: Reduce Pesticides and Fertilizers		X	
	OM6: Reduce Air Pollutants	X		
	OM7: Operation and Maintenance Innovation		X	

LA County DPW Infrastructure Sustainability Performance

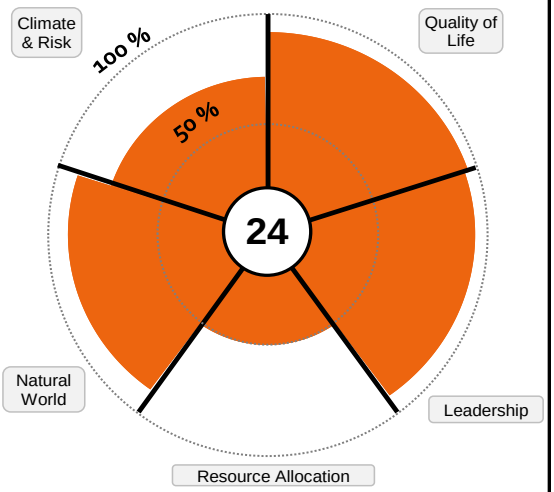


Number inside the circle = Mandatory+ Additional+Innovation strategies

Total possible points= 150

- MANDATORY
- ADDITIONAL
- INNOVATION
- NA CREDITS

LA County DPW Envision ® Preliminary Evaluation



Number inside the circle= Total Envision score (expressed as % of total applicable points)

Total possible score= 100

ENVISION EQUIVALENCY
BRONZE

See County of Los Angeles Sustainable Infrastructure Guidelines, Final June 2017, for more information

AECOM

Small Buildings Performance Summary

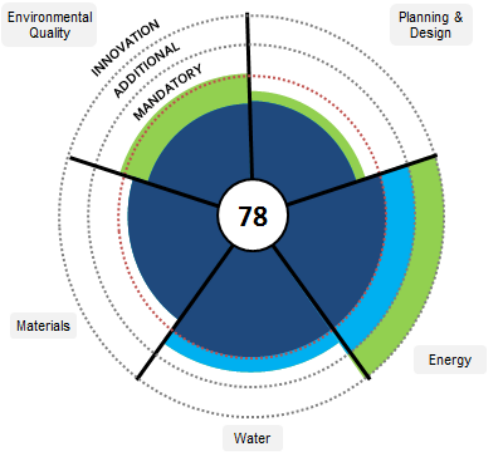
Project Name:		**Date:**	
Project ID:			
Project Manager:			
Design phase submission:			
Completed by (include email):		**Email:**	

☐ Exempt ☐ Unable to comply

If any of the above selected, provide supporting narrative here

	Action items	Achieved Y	N	NA
Planning and Design	**SB1.1:** (5.106.1) Storm water pollution prevention	X		
	SB1.1: (5.106.3) Low Impact Development (LID)	X		
	SB1.1: (5.106.10) Grading and Paving	X		
	SB1.1: (5.304) Outdoor water use	X		
	SB1.1: (5.160.4) Bicycle parking- short term, long term	X		
	SB1.1: (5.106.5.2) Designated parking for clean air vehicles	X		
	SB1.1: (5.106.5.3) Electric Vehicle (EV) Charging for future installation	X		
	SB1.1: (5.106.8) Light pollution reduction	X		
	SB2.1: (A5.106.11) Heat island effect Hardscape & cool roof	X		
	SB2.2: (5.106.5.2) Designated parking for clean air vehicles (10% of total spaces)		X	
	SB2.3: (5.106.5.3) Electric Vehicle (EV) Charging for future installation (8% of total spaces)		X	
	SB3.1: Use the IDW to implement sustainability strategies	X		
	SB3.2: Incorporate Sustainability Educational Signage	X		
	SB3.3: Evaluate Funding Opportunities		X	
	SB3.4: Open ENERGY STAR portfolio manager profile to track energy, water consumption		X	
	SB4.1: Incorporate sustainable design strategies in prefab/modular bldgs		X	
	SB4.2: Complete LEED: O+M checklist and consider pursuing certification		X	
	SB4.3: Achieve Exemplary performance levels		X	
Energy	**SB1.1:** (5.201.1) Comply with 2016 Building Energy Efficiency Standards	X		
	SB2.4: (A5.203.1.1.1) Outdoor Lighting (min 10% saving)	X		
	SB2.5: (A5.211.1) On-site renewable energy and documentation		X	
	SB2.6: (A5.203.1.2) 5% or 10% energy savings over baseline		X	
	SB3.5: Incorporate energy efficiency measures identified in ECM matrix	X		
	SB3.6: Specify Energy Star Appliances and lights wherever applicable		X	
	SB4.4: Evaluate ECM measures from matrix under 'Innovative / Other Strategies'		X	
	SB4.5: Conduct a feasibility analysis for Net Zero Energy		X	
	SB4.6: Achieve Exemplary performance levels		X	
Water	**SB1.1:** (5.303) Obtain approval for Indoor Water Use requirements	X		
	SB1.1: (5.304) Obtain approval for water budget for landscaping area	X		
	SB2.7: (A5.303.2.31) 12% reduction for indoor potable water use		X	
	SB2.8: Comply with one elective measure selected from Division 5.3		X	
	SB3.7: Water Efficient Landscaping (reduce by 30%)	X		
	SB3.8: Incorporate high efficiency irrigation and weather forecasting	X		
	SB4.7: Conduct a feasibility analysis for Net Zero Water		X	
	SB4.8: Achieve Exemplary performance levels		X	
Materials	**SB1.1:** (5.407.2.2.1) Design to prevent water intrusion into the building	X		
	SB1.1: (5.408.1) Obtain approval for a Recycling and Reuse Plan (RRP)	X		
	SB1.1: (5.410.1) Recycling by occupants	X		
	SB1.1: (5.410.4) Testing and adjusting of systems	X		
	SB2.9: (A5.405.1) Regional materials	X		
	SB2.10: (A5.405.2.1) Bio-based materials- Certified wood products	X		
	SB2.11: (A5.405.4) Recycled content - Tier 1 (min 10%)	X		
	SB2.12: (A5.405.5.2.1) Supplementary cementitious materials (SCMs)	X		
	SB2.13: (A5.406.1.1) Service life	X		
	SB2.14: (5.407.2.2.2) Flashing	X		
	SB2.15: (A5.408.3.1.1) Enhanced construction waste reduction–Tier 1 (min 65% diversion)	X		
	SB3.9: Material Ingredient Disclosures		X	
	SB3.10: Complete building material LCA study		X	
	SB4.9: Conduct a feasibility analysis for Net Zero Waste		X	
	SB4.10: Achieve Exemplary performance levels		X	
Environmental Quality	**SB1.1:** (5.503.1) Fireplaces	X		
	SB1.1: (5.504.3) Cover and protect MEP equipment in construction	X		
	SB1.1: (5.504.4) Meet standards for adhesives, sealants, caulks, paints,coatings & carpet	X		
	SB1.1: (5.504.4.5) Composite wood products	X		
	SB1.1: (5.504.4.6) Resilient flooring (80% of floor)	X		
	SB1.1: (5.504.7) Environmental tobacco smoke (ETS) control	X		
	SB1.1: (5.507.4.3) Interior sound transmission	X		
	SB1.1: (5.507.4.1) Exterior noise transmission	X		
	SB2.16: (A5.504.4.7.1) Resilient flooring systems, Tier 1 (90% of floor)	X		
	SB2.17: (A5.504.4.8) Thermal insulation, Tier 1	X		
	SB2.18: (A5.504.4.9) Acoustical ceilings and wall panels	X		
	SB2.19: (A5.504.5.3.1) Filters, Tier 1 (MERV 11)	X		
	SB2.20: (A5.507.1.1.1) Lighting (Individual task lighting for 90%)	X		
	SB2.21: (A5.507.1.2) Multi-occupant spaces	X		
	SB2.22: (A5.508.1.3) Hydrochlorofluorocarbons	X		
	SB4.11: Evaluate potential climate change stressors, impacts, and resilience		X	
	SB4.12: Achieve Exemplary performance levels		X	

LA County DPW Small Buildings Sustainability Performance

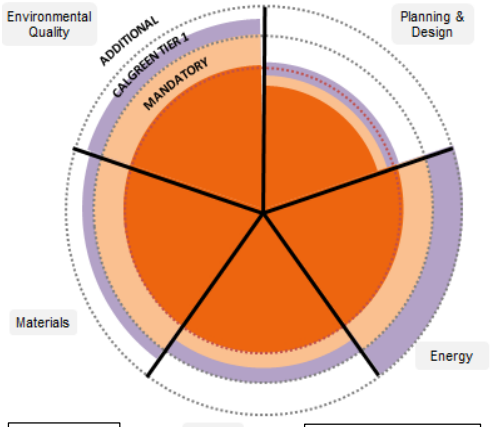


Number inside the circle = Mandatory+ Additional+Innovation strategies

Total possible points= 100

- MANDATORY
- ADDITIONAL
- INNOVATION

LA County DPW Small Buildings CALGreen® Preliminary Evaluation



CALGREEN TIER 1 EQUIVALENCY

NO

- MANDATORY
- CALGREEN TIER 1
- ADDITIONAL

See County of Los Angeles Sustainable Infrastructure Guidelines, Final June 2017, for more information

AECOM

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Infrastructure Sustainability Strategies

- Integrative Design (ID)
- Site (S)
- Water (W)
- Energy (E)
- Materials (M)
- Climate Mitigation and Resilience (CR)
- Construction (C)
- Operations and Maintenance (OM)

Integrative Design (ID)

Introduction

For all projects impacting the built environment, a comprehensive and thorough process for approaching a project through its life-cycle is essential for success.

To obtain sufficient engagement, input, and buy-in from all stakeholders, this process must begin during conceptual stages of the project. This ensures that the desired intent and benefit is determined for the ultimate users of the project and that the project has the resources to be executed and maintained to uphold its original vision. Further, by bringing all stakeholders (designers, contractors, operation staff, community, etc.) to the discussion early, it is possible that design synergies can be explored and incorporated without additional cost and respond to improving quality of life. For example, a roadway project that evaluates the complete streets concept from the start is more likely to be able to include safe bike lanes.

Integrative design also provides an opportunity to develop signage to highlight the sustainability features of a project to raise awareness for the public and/or staff.

Strategies

ID1	Hold Sustainability Kick-Off Meeting
ID2	Promote Stakeholder Engagement
ID3	Incorporate Complete Streets
ID4	Incorporate Sustainability Awareness
ID5	Integrative Design Innovation

ID1: Hold Sustainability Kick-Off Meeting

Intent: To integrate sustainability principles and performance goals into a project

Benefit: Ensure accountability and execution of sustainability principles and performance goals

Action Items	Required	Documentation[1]	Guidance / Reference
ID1.1: Use the IDW to implement sustainability strategies; identify the unique characteristics, opportunities, and constraints of the project site; and identify pre-existing conditions if applicable	✓	Narrative	• Envision LD1.1, LD1.3 • SITES Pre-Design Prerequisite 2.1 • SIG IDW (see Appendix A)
ID1.2: Outline key project parameters including the design intent, project stakeholders, scope, budget, and schedule	✓	Narrative	• Envision LD1.1, LD1.3

ID2: Promote Stakeholder Engagement

Intent: To encourage stakeholder participation to maximize benefits and acceptance of a project

Benefit: Promote collaboration, sharing of best practices, and buy-in for a project

Action Items	Required	Documentation	Guidance / Reference
ID2.1: Update the IDW at key project milestones with stakeholders	✓	Narrative	• Envision LD1.3 • SITES Pre-Design Credit 2.4 • Integrated Project Delivery: A Guide (The American Institute of Architects 2007)
ID2.2: Coordinate early with agencies, organizations, departments, and DPW divisions	✓	Narrative	• Envision LD1.3
ID2.3: Establish recordkeeping to encourage and facilitate information sharing across all divisions	✓	Narrative	• Envision LD1.2
ID2.4: Coordinate early with third-party approvers such as: Southern California Edison, the Fire Department, and/or other key entities	✓	Narrative	• Envision LD1.1
ID2.5: Incorporate public outreach		Narrative	• Envision LD1.4 • National Environmental Policy Act (NEPA)/2016 California Environmental Quality Act (CEQA) Statute and Guidelines • Metro's Community Relations team • Public Engagement and Noticing Manual (San Luis Obispo 2015)

[1] *Documentation type:*

Narrative: *Provide description on how the project meets specific action items (30-word limit).*
Plans, drawings, or specifications: *Reference specific drawings, plans, and specifications to show how action items are being met for the project.*
Calculations: *Document compliance with the action item through software simulations or manual calculations.*

ID3: Incorporate Complete Streets

Intent: To optimize multi-modal access and facilitate holistic, safe streetscapes for all users

Benefit: Enhance the public right-of-way for all users and promote equity for all modes of transportation

Action Items	Required	Documentation	Guidance / Reference
ID3.1: Integrate Complete Streets, where feasible, to facilitate the consideration and inclusion of bicycle, pedestrian, and transit modes in project strategies and performance measures	✓	Narrative	• Envision QL2.4 • Urban Street Design Guide - National Association of City Transportation Officials (NACTO)
ID3.2: Identify the project's "context zone" through three considerations: (1) development patterns (urban, suburban, rural), (2) land uses, and (3) special district considerations to determine the appropriate amenities to include for the project		Narrative	• Envision LD2.2 • Active Transportation Alliance's Complete Streets, Complete Networks: A Manual for the Design of Active Transportation, Chapter 3: Components for Assembling Complete Streets
ID3.3: Identify project team bicycle and pedestrian coordinator(s) to serve as advisor(s) and external liaison(s) to ensure project coordination and input from local agencies and stakeholders		Narrative	• Envision LD1.3, LD1.4 • Urban Street Design Guide - National Association of City Transportation Officials (NACTO) • Urban Bikeway Design Guide - National Association of City Transportation Officials (NACTO)

ID4: Incorporate Sustainability Awareness

Intent: To increase awareness of relevant sustainability issues pertaining to a particular project or site

Benefit: Facilitate learning opportunities for all stakeholders to promote the need for further sustainability initiatives

Action Items	Required	Documentation	Guidance / Reference
ID4.1: Incorporate a minimum of three educational components (e.g., signage, dashboard)		Narrative	• Envision QL1.1 • SITES Education Credit 9.1
ID4.2: Facilitate partnerships and extend sustainability education to local community groups		Narrative	• Envision QL1.1 • SITES Education Credit 9.1

ID5: Integrative Design Innovation

Intent: To encourage sustainable BMPs that are beyond code requirements and the efforts identified in these guidelines

Benefit: Ensure stakeholder engagement and buy-in to streamline processes, and incur time and cost savings on project implementation

Action Items	Required	Documentation	Guidance / Reference
ID5.1: Incorporate a context-sensitive approach to design (e.g., stormwater capture)		Narrative	• Envision Natural World (see entire section) • SITES Site Context (see entire section)
ID5.2: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines		Narrative	• Envision QL0.0, LD0.0, RA0.0, NW0.0, CR0.0

Site (S)

Introduction

Site development is a critical component of the built environment. DPW projects often affect public rights-of-way and other public areas that are a key part of the daily user experience. A streetscape's quality and sense of place are important to create a sustainable environment for people that live, work, and play in the County. A quality site attracts and retains citizens and business, leading to healthy communities and economies.

In contrast to buildings, landscape and green infrastructure have the potential to protect and even regenerate natural systems at a larger scale, therefore, enhancing the ecosystem.

This section provides guidance on evaluating site strategies and optimizing landscape, hardscape, and circulation. Through these focus areas, the County is committed to create and maintain a more sustainable public realm for its residents.

Strategies

S1	Incorporate Smart Master Planning
S2	Maximize Site Access and Circulation
S3	Incorporate Environmental Mitigation
S4	Incorporate Low Impact Development and Erosion Control
S5	Optimize Landscape Design
S6	Optimize Hardscape Design
S7	Optimize Smart Irrigation
S8	Site Innovation

S1: Incorporate Smart Master Planning

Intent: To integrate site assessment, protection of natural resources and surface water, and safety features

Benefit: Enhance site access, land use, and natural resources to improve community health and well-being

Action Items	Required	Documentation	Guidance / Reference
S1.1: Prepare a site assessment by incorporating site context and access opportunities • Preserve historic and cultural resources (if applicable)	✓	Narrative	• Envision LD2.2, QL3.1 • SITES Pre-Design Prerequisite 2.2 • Standard Plans: U.S. Customary Units (Caltrans 2015) - wildlife protected areas within construction site (netting, demarcation on plan) • 2015 Greenbook: Standard Specifications for Public Works Construction and Greenbook Standard Specifications 2016 Supplement
S1.2: Protect existing natural resources and surface water • Preserve prime habitats to the maximum extent possible • Prepare a stormwater pollution plan if the project involves significant soil disturbance, major reconstruction, or grinding and resurfacing adjacent to wetlands and surface water bodies	✓	Narrative	• Envision NW1.1, NW1.2, NW1.3, NW3.1 • LEED ND SLL Credit 6, 7, 8 • LEED GIB Credit 4 • SITES Context Prerequisite 1.2, 1.3, 1.4 • Standard Plans: U.S. Customary Units (Caltrans 2015) - wildlife protected areas within construction site (netting, demarcation on plans) • 2015 Greenbook: Standard Specifications for Public Works Construction and Greenbook Standard Specifications 2016 Supplement • Stormwater Pollution Prevention Plan (SWPPP) Preparation Manual (DPW 2010) • EPA's 2017 Construction General Permit (CGP) and Related Documents
S1.3: Contribute positively to community health and well-being • Maximize public gathering spaces to optimize placemaking • Include street furniture to encourage gathering • Incorporate parklets with water quality improvements • Incorporate community branding and wayfinding (such as signage) • Incorporate community gardens • Incorporate exercise equipment • Incorporate sidewalks, bike lanes, parks/trails/open spaces • Incorporate farmer's market or other street stalls		Plans, drawings, or specifications	• Envision QL2.1, QL2.6, QL3.3 • SITES HHWB Credit 6.5, 6.6 • People St Kit of Parts for Parklets (LA DOT 2014) • Park Design Guidelines and Standards (County 2014): - Planted Areas (pg. 36-38) - Grading/Drainage and LID - Site Design Strategies (pg. 41-42) - Park Furnishings (pg. 34) • Using Crime Prevention Through Environmental Design in Problem-Solving (Zahm 2007) • Metro's Station Wayfinding Signage Guidelines

Action Items	Required	Documentation	Guidance / Reference
S1.4: Enhance road safety • Implement traffic calming measures where feasible, including multi-modal enhancements and physical separation to differentiate roadway uses • Consider roundabout design during preliminary engineering and design to improve Level of Service, reduce construction costs, improve street safety, and optimize traffic flow • Provide highly retro-reflective non-illuminated technology in traffic signal mast arm-mounted street name signs for new projects in and outside of lighting districts • Use light-emitting diode (LED) Vehicle Safety Warning Beacon technology where appropriate		Plans, drawings, or specifications	• Envision QL2.1, QL2.6 • LEED ND GIB Credit 17 • SITES HHWB Credit 6.2 • DPW's Neighborhood Traffic Management Program • County Code for Non-Illuminated Technology • Roundabout Policy and Design Practices for County of Los Angeles (DPW 2007) • Roundabout Geometric Design Guidance (Caltrans) • Using Crime Prevention Through Environmental Design in Problem-Solving (Zahm 2007) • County Fire Department's Fire Requirements • Urban Street Design Guide - National Association of City Transportation Officials (NACTO) • Use BMPs identified in the reference manual: Using Crime Prevention Through Environmental Design in Problem-Solving (Zahm 2007)

S2: Maximize Site Access and Circulation

Intent: To create an optimized environment for multi-modal circulation where possible

Benefit: Improve accessibility for the community including pedestrians and bicycle users

Action Items	Required	Documentation	Guidance / Reference
S2.1: Improve community connections, mobility, and access • Maximize intermodal connections • Evaluate location of public transit and community services to enhance intermodal connections • Add bike racks or lockers, as well as bike repair stations, at relevant intermodal connections • Implement dynamic signage to encourage alternative modes of transportation, promote ease of access, and enhance safety features for non-motorized transportation • Promote accessible parking for electric vehicles (EVs) and the installation of EV charging stations for intermodal connections	✓	Plans, drawings, or specifications	• Envision LD1.3, LD2.2, QL2.4, QL2.5, QL2.6 • LEED ND SLL Credit 4 • LEED ND NPD Prerequisite 3 • SITES Context Credit 1.7, HHWB Credit 6.9 • 2015 Greenbook: Standard Specifications for Public Works Construction and Greenbook Standard Specifications 2016 Supplement • Bicycle Master Plan (County 2012): Appendix F. Design Guidelines • Urban Wayfinding Planning and Implementation Manual • Multi-Modal Navigation Tools: Improving User Information for Walking, Cycling and Public Transit • Just In Time: Enhanced Mobility and Equity through Real-Time Information (George Mason University 2016)
S2.2: Improve site accessibility, safety, and wayfinding • Provide access to transit where feasible • Incorporate community feedback into preferred routes where feasible • Improve bicycle linkages and bike racks and lockers within a 1-mile radius of nearest transit station	✓	Plans, drawings, or specifications	• Envision QL2.4, QL2.6, LD1.4 • LEED ND SLL Credit 4 • SITES HHWB Credit 6.2 • Bicycle Master Plan (County 2012): Appendix F. Design Guidelines • First Last Mile Strategic Plan & Planning Guidelines (Metro 2014) • Transit Oriented Development Grant Program Guidelines (Metro 2011) • Mobility Hubs in Los Angeles: Emerging Nodes of Transportation • Mobility Hubs: A Reader's Guide • Bikeable Design: A Toolkit for Bike-Friendly Development (Department of City Planning 2013)
S2.3: Optimize public environment for pedestrians • Incorporate community feedback into preferred pedestrian routes where feasible • Ensure that the project location includes pedestrian access to multi-modal transportation options • Encourage Transit-Oriented Development (TOD) projects to include community mobility and access to key destinations with direct access to public transit and non-motorized transportation • Improve pedestrian linkages within a 1-mile radius of transit stations • Consider pedestrian lighting to support night-time activities		Narrative, plans, drawings, or specifications, calculations	• Envision QL2.4, QL2.5 • Statewide Guide for the California Building Codes: Accessibility • Department of Building and Safety's Accessibility Forms & Publication resources • Planning And Zoning (Assembly Bill No. 744 Chapter 699): Does not require parking ratios associated with affordable housing projects, projects receiving a density bonus or that provide direct access to transit • Transit Oriented Development Grant Program Guidelines (Metro 2011) • Metro's Active Transportation Guidelines
S2.4: Provide EV charging stations and carpool priority parking where feasible		Plans, drawings, or specifications	• Envision QL2.5 • SITES HHWB Credit 6.9

S3: Incorporate Environmental Mitigation

Intent: To mitigate the environmental impact of infrastructure development

Benefit: Protect ecological environment and habitat, and reduce the effect of urban heat island to improve quality of life

Action Items	Required	Documentation	Guidance / Reference
S3.1: Mitigate heat island effect • Implement reflective materials available for roadways and roofing, and incorporate shaded areas through landscaping and tree cover • Facilitate provision of shade through tree planting	✓	Plans, drawings, or specifications	• Envision CR2.5 • LEED ND GIB Credit 9 • SITES Soil+Veg Credit 4.9 • Achieve at least 30% of hardscape surfaces meeting shading or Solar Reflectance Index (SRI) requirements of 29 or higher
S3.2: Encourage ecological connectivity and habitat (if applicable)		Plans, drawings, or specifications	• Envision NW1.4 • LEED ND SLL Credit 7 • SITES Context Prerequisite 1.3
S3.3: Protect site and incorporate existing natural features where feasible		Plans, drawings, or specifications	• Envision NW1.1, NW1.2, NW1.5, NW1.7 • LEED ND GIB Credit 7
S3.4: Avoid soil compaction and staging within tree driplines or restore disturbed soils (when feasible)		Plans, drawings, or specifications	• Envision NW3.3 • County's Tree Planting Ordinance

S4: Incorporate Low Impact Development and Erosion Control

Intent: To protect and promote water quality

Benefit: Optimize local water quality

Action Items	Required	Documentation	Guidance / Reference
S4.1: Incorporate green infrastructure features and/or green streets		Plans, drawings, or specifications	• Envision LD2.2, NW2.1, NW2.3 • Low Impact Development: Standards Manual (DPW 2014) • CASQA's Stormwater Best Management Practice Handbook: New Development and Redevelopment • County of San Diego BMP Design Manual for Permanent Site Design, Storm Water Treatment and Hydromodification Management (DPW 2016) • Managing Wet Weather with Green Infrastructure, Municipal Handbook, Green Streets (EPA 2008) • Urban Street Stormwater Guide - National Association of City Transportation Officials (NACTO)
S4.2: Prevent surface and groundwater contamination • Manage stormwater on-site to prevent the contamination of downstream ecosystems • Install markers on all stormwater catch basins to alert people not to pour hazardous materials down drains as per the County's stenciling and signage requirements • Develop construction and post-construction spill and/or leak prevention and response plans		Plans, drawings, or specifications	• Envision NW2.3 • SITES Water Prerequisite 3.1 • 2015 Greenbook: Standard Specifications for Public Works Construction and Greenbook Standard Specifications 2016 Supplement • Low Impact Development: Standards Manual (DPW 2014) • Appendix D: Standard Urban Storm Water Mitigation Plan - Los Angeles County Urban Runoff And Storm Water NPDES Permit • Construction Site Best Management Practices (BMPs) Manual (DPW 2010) • Stormwater Pollution Prevention Plan (SWPPP) Preparation Manual (DPW 2010)
S4.3: Minimize erosion by mitigating the adverse effects of construction on steep slopes		Plans, drawings, or specifications	• Envision NW1.6 • LEED ND SLL Credit 6 • Grading Guidelines (DPW 2008) • County's Hillside Management Areas (HMA) Ordinance

S5: Optimize Landscape Design

Intent: To ensure adaptability and longevity of landscape within the surrounding environment and project site

Benefit: Promote sustainable landscapes that can thrive in their surrounding environment and reduce the need for ongoing maintenance and replacement

Action Items	Required	Documentation	Guidance / Reference
S5.1: Incorporate plant species biodiversity	✓	Plans, drawings, or specifications	• Envision NW3.1 • County's Tree Planting Ordinance • Projects in the high hazard fire zone shall provide landscape design for the high hazard fire zone
S5.2: Minimize all turf; utilize native vegetation and a low-water plant pallet	✓	Plans, drawings, or specifications	• Envision RA3.2, NW3.2 • LEED ND GIB Credit 4 • SITES Soil+Veg Credit 4.6, 4.7 • U.S. Department of Agriculture's Interactive Gardening and Plant Hardiness Zone Map for California • Department of Water Resources' Water Use Efficiency: Making Water Conservation a California Way of Life • California Model Water Efficient Landscape Ordinance (MWELO)
S5.3: Control invasive plant species	✓	Plans, drawings, or specifications	• Envision NW3.2 • SITES Soil+Veg Prerequisite 4.2 • California Invasive Plant Council's Invasive Plant Inventory • County Fire Department's Fire Requirements
S5.4: Plant pest resistant species to avoid the need for pesticides		Plans, drawings, or specifications	• Envision NW2.2 • Native & Drought Tolerant Plants - Countywide Smart Gardening Program
S5.5: Use mulch or compost to increase water retention		Plans, drawings, or specifications	• Envision RA3.2 • LEED ND GIB Credit 4

S6: Optimize Hardscape Design

Intent: To enhance both the aesthetics and environmental functions through landscape design

Benefit: Create landscaped environment that contributes to the environmental benefit of the community

Action Items	Required	Documentation	Guidance / Reference
S6.1: Maximize permeable surface where paving is required	✓	Calculations	• Envision NW2.1 • Low Impact Development: Standards Manual (DPW 2014) • Interlocking Concrete Pavement Institute's Resource Library • If the project is associated with parks, requirements in the Green Building Code shall apply and the California Building Codes will also apply especially the Americans with Disabilities Act portion
S6.2: Incorporate cool pavement/high albedo pavement		Plans, drawings, or specifications	• Envision CR2.5 • Using Cool Pavements to Reduce Heat Islands (EPA Heat Islands)

S7: Optimize Smart Irrigation

Intent: To integrate smart irrigation to minimize water usage and maximize water saving

Benefit: Reduce the potable water consumption needs for irrigation purposes

Action Items	Required	Documentation	Guidance / Reference
S7.1: Conduct water metering if site is over 5,000 SF	✓	Plans, drawings, or specifications	• Envision RA3.3 • Department of Water Resources' Water Use Efficiency: Making Water Conservation a California Way of Life
S7.2: Minimize outdoor water use (unless reclaimed water will be used for the project)	✓	Calculations	• Envision RA3.1, RA3.2 • SITES Water Prerequisite 3.2 • Department of Water Resources' Water Use Efficiency: Making Water Conservation a California Way of Life • California Model Water Efficient Landscape Ordinance (MWELO)
S7.3: Use smart irrigation controller(s) and high-efficiency irrigation	✓	Plans, drawings, or specifications	• Envision RA3.1, RA3.2 • California Model Water Efficient Landscape Ordinance (MWELO)

S8: Site Innovation

Intent: To encourage sustainable BMPs that are beyond code requirements and the efforts identified in these guidelines

Benefit: Implement sustainability practices that demonstrate innovative approaches and technologies for a site

Action Items	Required	Documentation	Guidance / Reference
S8.1: Develop pilot or demonstration projects to stimulate sustainable growth and development with regard to sustainability site and landscape strategies to target one or more of the following: • Environment improvement • Aesthetics • Community benefit • Public health improvement		Plans, drawings, or specifications	• Envision QL1.2, QL2.1, QL3.2, QL3.3, QL0.0, NW0.0
S8.2: Participate in conferences and other knowledge-sharing opportunities to stay abreast in the industry, share lessons learned, and share best practices		Narrative	• Envision LD1.1, LD1.3
S8.3: Work with local community to enhance bike and pedestrian network and/or bike share program		Plans, drawings, or specifications	• Envision QL2.4 • LEED ND SLL Credit 4
S8.4: Incorporate green roofs		Plans, drawings, or specifications	• Envision NW2.1, CR2.5
S8.5: Consider induction charging, solar roadways, and other emerging technologies		Plans, drawings, or specifications	• Envision QL2.5
S8.6: Restore existing plazas, parks, recreational areas, or wildlife refuges as part of a given project; consider using existing features where applicable		Plans, drawings, or specifications	• Envision QL3.3
S8.7: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines		Narrative	• Envision QL0.0, LD0.0, RA0.0, NW0.0, CR0.0

Water (W)

Introduction

Water is an essential resource that affects our resident's daily life and the County's operations in numerous ways. The quality of our water is important to provide an adequate supply of drinking water to residents and maintain the health of our water bodies for recreation and habitat. Improving the quality of stormwater runoff from our facilities benefits the health of creeks, rivers, lakes, bays, and coastal waters, while controlling its quantity also reduces the risk of flooding and damage to natural drainage features. Creating projects that work to restore natural hydrology features and apply LID strategies aid in reducing flooding, augmenting groundwater supplies, and removing pollutants such as trash, metals, bacteria, nutrients, and pesticides.

Strategies

W1	Improve Water Quality
W2	Restore Natural Hydrology
W3	Reduce Flooding
W4	Optimize Stormwater Reuse
W5	Reduce Potable Water Consumption
W6	Water Innovation

In an undeveloped landscape, most rainfall will infiltrate into the native soil and be stored as groundwater, or flow through natural creeks and streams to rivers and eventually to the ocean. As watersheds are urbanized, much of the vegetation is replaced by streets, parking lots, or buildings. These impervious surfaces reduce the opportunity for infiltration and groundwater recharge and increase surface runoff, which may contain pollutants. Further, the increase in stormwater runoff from developed watersheds increases the likelihood of more frequent and more severe flooding that may degrade aquatic habitat. For these reasons, a comprehensive and sustainable approach to managing the County's water resources was developed to help protect homes, infrastructure, and the region's most valuable natural resource—water.

W1: Improve Water Quality

Intent: To reduce pollutants entering our local waterways and improve the quality of receiving waters

Benefit: Achieve healthier creeks, rivers, lakes, and bays, and improve recreational opportunities

Action Items	Required	Documentation	Guidance / Reference
W1.1: For initial planning, review site design concepts and constraints specific to the LA region • Consult with DPW Watershed Management Division staff for additional guidance/input regarding constraints relating to the specific site based on compliance with the MS4 permit	✓	Narrative	• Envision LD3.2 • Green Infrastructure for Los Angeles: Addressing Urban Runoff and Water Supply through Low Impact Development (Chau 2009) • American Society of Landscape Architect's Green Infrastructure • Los Angeles Regional Water Quality Control Board's MS4 Permit-Watershed Management Programs • MS4 Discharges within Coastal Watersheds of LA County, Order No. R4-2012-0175
W1.2: Review the Stormwater BMP Design and Maintenance Manual and the County's Hydrology Manual for Publicly Maintained Storm Drain Systems	✓	Plans, drawings, or specifications	• Envision LD3.2 • Low Impact Development: Standards Manual (DPW 2014) • Hydrology Manual (DPW 2006)
W1.3: Review and maximize LID design integration, where feasible	✓	Narrative	• Envision LD2.2, NW2.1 • Los Angeles Regional Water Quality Control Board's Los Angeles MS4 Permit Low Impact Development (LID) Ordinances and Green Street Policies • Low Impact Development: Standards Manual (DPW 2014) • Managing Wet Weather with Green Infrastructure, Municipal Handbook, Green Streets (EPA 2008) • Managing Wet Weather with Green Infrastructure, Municipal Handbook, Rainwater Harvesting Policies (EPA 2008) • Managing Wet Weather with Green Infrastructure, Action Strategy (EPA 2008) • Covenant And Agreement Letter for Maintenance of LID BMPs - LA County Building & Safety Forms
W1.4: Consider drought-tolerant landscaping resources for native plants that reduce the need for fertilizer application; consider placement of non-invasive drought-tolerant plant and tree species that are appropriate for the climate zone of the project	✓	Narrative	• Envision NW2.2, NW3.1, NW3.2 • Sunset Western Garden Collection's Sunset Climate Zones • Department of Water Resources' Water Efficient Landscape Ordinance, Water Budget Calculator • Urban Forest Ecosystem Institute's SelecTree: A Tree Selection Guide • Los Angeles River Master Plan, Landscaping Guidelines and Plant Palettes (DPW 2004) • California Model Water Efficient Landscape Ordinance (MWELO)
W1.5: Review design parameters for River and Channel Greenway Projects (LA County Flood Control District right-of-way) and consult with DPW Watershed Management Division staff for additional guidance/input	✓	Narrative	• Envision NW1.5 • Los Angeles River Master Plan, Landscaping Guidelines and Plant Palettes (DPW 2004): Part I, Los Angeles River Landscape Design Considerations

Action Items	Required	Documentation	Guidance / Reference
W1.6: Capture and retain 100% of the Stormwater Quality Design Volume (SWQDv) on-site through LID methods, unless technically infeasible to do so; comply with the LID 2014 Section 3; consult with DPW's Land Development Division and Watershed Management Division for additional guidance/input	✓	Calculations	• Envision NW2.1 • Low Impact Development: Standards Manual (DPW 2014) • Los Angeles Regional Water Quality Control Board's MS4 Permit-Watershed Management Programs • Green Infrastructure Guidelines (DPW 2011)
W1.7: Integrate treatment BMPs that target existing water quality impairments and applicable total maximum daily load pollutants; consult with DPW Watershed Management Division staff to identify requirements relating to the specific site based on compliance with the MS4 permit		Narrative	• Envision NW2.1, NW2.2, NW2.3 • Los Angeles Regional Water Quality Control Board's MS4 Permit-Watershed Management Programs • Los Angeles Regional Water Quality Control Board's Impaired Water Bodies List • Los Angeles Regional Water Quality Control Board's Total Maximum Daily Load (TMDL) Program
W1.8: Design facilities to minimize pollutant releases to sensitive environments, floodplains, and groundwater; consult with DPW Geotechnical and Materials Engineering Division for additional guidance/input regarding infiltration sites		Narrative	• Envision NW2.3 • EPA's Oil Spills Prevention and Preparedness Regulations • GMED GS 200.1 Manual - Guidelines For Design, Investigation, And Reporting Low Impact Development Stormwater Infiltration (DPW 2014)
W1.9: Design to reduce soil disturbance and maximize on-site beneficial reuse; restore disturbed soils for percolation and plant growth potential during construction		Narrative	• Envision NW1.1, NW3.3 • Restoring Soil Health To Urbanized Lands: The Crucial Link between Waste Prevention, Land Use, Construction, Stormwater Management and Salmon Habitat Restoration (State of Oregon Department of Environmental Quality 2001) • Best Management Practice Fact Sheet 4: Soil Restoration (Virginia Cooperative Extension 2013)

W2: Restore Natural Hydrology

Intent: To mimic the landscape's pre-development hydrology by enabling infiltration close to the source

Benefit: Restore the natural hydrology aspects to reduce erosion, improve groundwater recharge, and improve downstream water quality

Action Items	Required	Documentation	Guidance / Reference
W2.1: Incorporate dry or vegetated drainage pathways that integrate inline/offline stormwater retention/detention opportunities • Create micro drainage areas to avoid concentrated flow • Use (or create) high-permeability soil areas as open space for infiltration	✓	Plans, drawings, or specifications	• Envision NW1.4, NW3.3
W2.2: Mitigate hydromodification and/or preserve/restore watercourse stability and natural streambed sediment transport • Balance ecosystem function and natural sediment transport for beach replenishment (capture fines, allow bypass of sands and gravel)	✓	Plans, drawings, or specifications	• Envision NW3.3, NW3.4 • Low Impact Development: Standards Manual (DPW 2014): Section 8 • Hydromodification Assessment and Management in California (SCCWRP 2012)
W2.3: Conserve site's existing natural qualities for runoff management and treatment • Preserve existing trees and mature vegetation as site amenities • If located within existing floodplain, maintain pre-development infiltration and water quality	✓	Narrative	• Envision NW2.1, NW3.4
W2.4: Favor placement of detention/retention/infiltration facilities in upstream areas to capture runoff close to its source • Analyze project's watershed, and identify locations most appropriate for infiltration • Conduct geotechnical testing as needed to verify soil percolation rates of existing/native soils • Disconnect hardscapes as much as practicable		Plans, drawings, or specifications	• Envision NW2.1
W2.5: Maximize permeable surface area • Integrate pervious features on large parcels (i.e., parking lots) to reduce runoff volume • Maximize placement of infiltration systems, depressed vegetated islands, and perimeter swales for multiple infiltration opportunities		Plans, drawings, or specifications	• Envision NW3.4
W2.6: Reduce design slope on embankments, and promote creation of flat areas for improved infiltration and meandering of surface runoff		Narrative	• Envision NW1.6 • Addressing Green Infrastructure Design Challenges in the Pittsburgh Region: Steep Slopes (EPA 2014) • Washington State Department of Ecology's Managing Drainage on Coastal Bluffs

W3: Reduce Flooding

Intent: To preserve floodplain functions and reduce flood risk and potential loss or injury to people or structures

Benefit: Generate public health benefits, reduce loss of productivity, and reduce insurance payouts (Federal Emergency Management Agency/State/City/Private)

Action Items	Required	Documentation	Guidance / Reference
W3.1: Protect, maintain, and create absorbent landscapes; maximize use of pervious paving where paving is needed • Achieve minimum 25% of pervious pavement for total hardscape area • Mitigate and minimize floodplain function impact along all watercourses where existing urbanization has created adjacent hardscape	✓	Plans, drawings, or specifications	• Envision NW2.1, NW3.4 • Managing Wet Weather with Green Infrastructure, Municipal Handbook, Green Streets (EPA 2008)
W3.2: Develop opportunities for floodplain optimization and increasing its function via pipe daylighting, existing bank widening, offline systems, dry ponds, etc. • Develop LID plan and associated reports • Utilize open space and larger park areas for temporary storage or infiltration	✓	Narrative	• Envision NW1.5 • Low Impact Development: Standards Manual (DPW 2014)
W3.3: Meet or exceed on-site storage capacity requirements • Attempt to exceed SWQDv required by the 2014 LID Standards Manual as the baseline goal • Identify infiltration/storage opportunities higher in drainage area to reduce size of BMPs downstream	✓	Calculations	• Envision NW2.1 • Low Impact Development: Standards Manual (DPW 2014) • CASQA's Stormwater BMP Best Management Practice Handbook: New Development and Redevelopment

W4: Optimize Stormwater Reuse

Intent: To harvest stormwater to reduce potable water consumption for non-potable purposes such as irrigation

Benefit: Diversify the water supply portfolio by utilizing stormwater as a valuable primary water resource

Action Items	Required	Documentation	Guidance / Reference
W4.1: Review opportunities to feasibly harvest stormwater for storage and reuse	✓	Narrative	• Envision RA3.2, NW2.1 • Managing Wet Weather with Green Infrastructure, Municipal Handbook, Rainwater Harvesting Policies (EPA 2008) • City of Santa Monica's Urban Runoff Rainwater Harvesting Resources • State Water Resources Control Board's Strategy to Optimize Resource Management of Storm Water (Storm Water Strategy, STORMS)
W4.2: Maximize opportunities for stormwater harvesting and reuse of stormwater to meet project's non-potable needs, where applicable	✓	Plans, drawings, or specifications	• Envision RA3.2 • Low Impact Development: Standards Manual (DPW 2014): Section 7 • Guidelines for Alternative Water Sources: Indoor and Outdoor Non-Potable Uses (County Department of Health 2016)
W4.3: Incorporate real-time controls into large-scale stormwater capture/reuse systems for optimizing flood control and groundwater recharge		Plans, drawings, or specifications	• Envision NW0.0, LD3.2, RA3.2, NW2.1 • Final Report: Stormwater Flow Control Device (EPA 2008) • Guidelines for Alternative Water Sources: Indoor and Outdoor Non-Potable Uses (County Department of Health 2016) • California Model Water Efficient Landscape Ordinance (MWELO)

W5: Reduce Potable Water Consumption

Intent: To create an efficient and water-conscious community

Benefit: Reduce consumptive demand on existing potable water supplies

Action Items	Required	Documentation	Guidance / Reference
W5.1: Reduce overall potable water consumption needs to meet/exceed current county/state goals (such as specify low-flow/high-efficiency fixtures and irrigation systems)	✓	Plans, drawings, or specifications	• Envision RA3.2 • U.S. Green Building Council, Indoor Water Use Reduction • Department of Water Resources' Water Efficient Landscape Ordinance, Water Budget Calculator • EPA's WaterSense • Recycled Water Urban Irrigation User Manual (Los Angeles WaterReuse California 2014)
W5.2: Locate water supply meters at strategic points to monitor usage, improve efficiencies, detect leaks, and support future tracking and reporting of water consumption	✓	Narrative	• Envision RA3.3 • Water Conservation Plan Guidelines (EPA 1998) • Metering in California (Pacific Institute 2014) • Smart Metering for Water Utilities (Oracle 2009) • Measuring Performance of Water Systems in California (Mercer and Christensen 2011) • Data Management and Plan Performance/Monitoring (Santa Ana Watershed Project Authority 2014)
W5.3: Increase public benefit and education of water conservation through implementation of wastewater and stormwater capture/reuse demonstration projects		Plans, drawings, or specifications	• Envision QL1.1, NW2.1 • Guidelines for Alternative Water Sources: Indoor and Outdoor Non-Potable Uses (County Department of Health 2016) • Managing Wet Weather with Green Infrastructure, Municipal Handbook, Green Streets (EPA 2008)

W6: Water Innovation

Intent: To encourage sustainable BMPs that are beyond mandated requirements and the efforts identified in these guidelines

Benefit: Improve water resource sustainability and reduce operations and maintenance; identify potential implementation of candidate projects to improve stormwater treatment capabilities and optimize pollutant treatment efficiencies; and create outreach and education opportunities for the public

Action Items	Required	Documentation	Guidance / Reference
W6.1: Incorporate whole systems balance planning for water		Narrative	• Envision RA3.2, NW2.1
W6.2: Participate in conferences and other knowledge-sharing opportunities to stay abreast in the industry, share lessons learned, and share best practices • In addition, seek partners, such as BMP vendors, for demonstration projects, cooperative research, and development agreements • Partner with local universities to explore water innovation opportunities		Narrative	• Envision QL0.0, LD0.0, RA0.0, NW0.0, CR0.0 • American Society of Civil Engineers' International Low Impact Development Conference • StormCon: The Surface Water Quality Conference and Expo • American Water Works Association California-Nevada Section • U.S. Green Building Council Los Angeles Chapter • Institute for Sustainable Infrastructure • International Conference on Sustainable Design, Engineering and Construction • California Stormwater Quality Association's Annual Conference
W6.3: Develop pilot or demonstration project or adjust scope of typical DPW projects to include stormwater treatment technologies to target one or more of the following: • Environmental improvement • Aesthetic and community benefit • Public health improvement		Plans, drawings, or specifications	• Envision QL0.0, LD0.0, RA0.0, NW0.0, CR0.0 • San Francisco Public Utilities Commission - Living Machine
W6.4: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines		Narrative	• Envision QL0.0, LD0.0, RA0.0, NW0.0, CR0.0

Energy (E)

Introduction

Minimizing energy consumption and incorporating renewable/ alternative energy has many co-benefits including reduction of energy demand, greenhouse gas (GHG) emissions, and operating costs. To conserve energy, energy-efficient lighting, equipment, and controls are necessary in addition to a whole-systems design approach. Collection of energy consumption data assists with detecting and improving inefficiencies.

This section provides recommendations on incorporating energy conservation measures (ECMs) and renewable/alternative energy strategies. Many of these action items enhance energy reliability, create redundancy, and potentially address energy security. As the cost of LED fixtures and solar panels continues to fall and the efficiency improves, targeting net zero energy projects is potentially attainable for a number of DPW projects.

Strategies

E1	Minimize Light Pollution
E2	Reduce Energy Consumption
E3	Incorporate Energy Sub-Metering
E4	Commission Energy Systems
E5	Incorporate Renewable/ Alternative Energy
E6	Optimize Traffic Signals Systems
E7	Optimize Street Lighting
E8	Energy Innovation

E1: Minimize Light Pollution

Intent: To minimize impacts of light pollution on the surrounding environment

Benefit: Promote a greater symbiosis between the built and natural environment

Action Items	Required	Documentation	Guidance / Reference
E1.1: Design lighting to reduce light spillage effects and glare through the application of cutoff lenses that direct lighting to where it is needed	✓	Plans, drawings, or specifications	• Envision QL2.3 • SITES HHWB Credit 6.8 • County's Rural Outdoor Lighting District Ordinance
E1.2: Evaluate lamp brightness based on background illumination condition; replace existing lamps to improve light quality	✓	Narrative	• Envision QL2.3

E2: Reduce Energy Consumption

Intent: To conserve energy by reducing overall operation and maintenance energy consumption

Benefit: Reduce energy demand, associated GHG emissions, and energy operating costs

Action Items	Required	Documentation	Guidance / Reference
E2.1: Take a whole-systems design approach to energy systems	✓	Plans, drawings, or specifications	• Envision RA2.1
E2.2: Incorporate high-efficiency lighting and lighting controls (while still maintaining safety with regard to lighting)	✓	Plans, drawings, or specifications	• Envision RA2.1 • DPW's LED Highway Safety Light Replacement Program • DPW's Procedures for the Preparation of Street Light Layouts • Illuminating Engineering Society (IES) Design Guides
E2.3: Use energy-efficient and/or low carbon or alternative fuel equipment where feasible (e.g., pumps)	✓	Plans, drawings, or specifications	• Envision RA2.1 • American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) • State of California Energy Action Plan II Implementation Roadmap for Energy Policies (California Energy Commission 2005)
E2.4: Add motion sensors to equipment/fixtures	✓	Plans, drawings, or specifications	• Envision RA2.1 • Graybook: Additions and Amendments to the Standard Specifications for Public Works Construction (DPW 2006) - to add dimmers or motion sensors lighting
E2.5: Incorporate dynamic lighting (remote sensing in large areas, not for public roadway applications)		Plans, drawings, or specifications	• Envision RA2.1 • Graybook: Additions and Amendments to the Standard Specifications for Public Works Construction (DPW 2006) - to add remote sensor lighting

E3: Incorporate Energy Sub-Metering

Intent: To collect more granular data on energy consumption across a site and facilities

Benefit: Target inefficiencies and reduce energy consumption

Action Items	Required	Documentation	Guidance / Reference
E3.1: Incorporate energy sub-metering to support future tracking and reporting of energy consumption	✓	Plans, drawings, or specifications	• Envision RA2.3

E4: Commission Energy Systems

Intent: To ensure efficient energy systems through commissioning and monitoring

Benefit: Promote and sustain high-efficiency sites and facilities; minimize maintenance and construction issues

Action Items	Required	Documentation	Guidance / Reference
E4.1: Incorporate energy commissioning		Plans, drawings, or specifications	• Envision RA2.3 • 2016 Nonresidential Compliance Manual, Chapter 12, Building Commissioning Guide - Modify Building and Safety Division, Title 31, Form 5.410 - Basis of Design
E4.2: For design-build projects, develop and review detailed commissioning implementation plan based on design-build entity's final design		Plans, drawings, or specifications	• Envision RA2.3 • SITES Construction Prerequisite 7.1

E5: Incorporate Renewable/Alternative Energy

Intent: To reduce the use of nonrenewable/alternative energy

Benefit: Reduce nonrenewable/alternative energy use, associated GHGs, and operating costs

Action Items	Required	Documentation	Guidance / Reference
E5.1: Incorporate renewable or alternative energy (including but not limited to wind, geothermal, waste-to-energy)		Plans, drawings, or specifications	• Envision RA2.2
E5.2: Use solar panels on roof/parking structures		Plans, drawings, or specifications	• Envision RA2.2 • Modify County evaluation criteria and plan review checklist for Solar Panels
E5.3: Conduct assessment of cost-effective photovoltaic (PV) system		Calculations	• Envision RA2.2

E6: Optimize Traffic Signals Systems

Intent: To promote the efficiency and reliability of traffic signals systems

Benefit: Optimize traffic flow and reduce maintenance/replacement costs

Action Items	Required	Documentation	Guidance / Reference
E6.1: Incorporate LED technology in all new traffic signals	✓	Plans, drawings, or specifications	• Envision RA2.1 • Traffic and Lighting Division Traffic Signal Plan Drafting Guide (DPW 2015)
E6.2: Incorporate time-based coordination, traffic responsive or adaptive traffic control systems	✓	Plans, drawings, or specifications	• Envision RA0.0 • Caltrans and City systems using adaptive control
E6.3: Use fiber optic or wireless communication systems to remotely communicate to traffic control and use monitoring devices for better traffic management		Plans, drawings, or specifications	• Envision RA0.0

E7: Optimize Street Lighting

Intent: To promote the efficiency and reliability of street lighting

Benefit: Optimize traffic lighting for visibility and safety; reduce maintenance and replacement costs

Action Items	Required	Documentation	Guidance / Reference
E7.1: Use LED technology for street and pedestrian lighting	✓	Plans, drawings, or specifications	• Envision RA2.1 • County's Lighting Maintenance Districts Projects
E7.2: Encourage Lighting Management Districts to switch to LEDs		Plans, drawings, or specifications	• Envision RA2.1 • Landscaping and Lighting Act Districts
E7.3: Use a reduced foot candle requirement/re-lamp/re-ballast interior light with instant start ballast		Calculations	• Envision RA2.1 • Use standard tables/building requirements from Title 24 • Use Lighting Standards - Roadway Lighting American National Standards Institute (ANSI)/IES RP-8-14 • County's Street Lighting Standard- Procedures for the Preparation of Streetlight Plans (DPW 2016)

E8: Energy Innovation

Intent: To encourage sustainable BMPs that are beyond code requirements and the efforts identified in these guidelines

Benefit: Reduce the demand for nonrenewable energy consumption and promote renewable and alternative energy sources for infrastructure needs

Action Items	Required	Documentation	Guidance / Reference
E8.1: Consider solar roadway technology for roads, crosswalks, sidewalks, parking lots, and bike paths in areas of the County with snowfall to assist with reduced maintenance and safety		Plans, drawings, or specifications	• Envision RA0.0 • Solar Roadways information • SolaRoad factsheet • Solmove • Wattway Summary
E8.2: Develop pilot or demonstration project with regard to energy reduction and renewable/alternative energy technologies		Plans, drawings, or specifications	• Envision RA0.0
E8.3: Consider Energy Savings Performance Contracting partners/projects to implement renewable/alternative energy projects		Plans, drawings, or specifications	• Envision RA0.0, RA2.2
E8.4: Use Demand Response programs (temporary measures to implement for high temperature events)		Plans, drawings, or specifications	• Envision RA0.0 • Develop a Matrix of Commercial Demand Response and Load Shift programs • Pacific Gas and Electric Company's Demand Response Programs
E8.5: Partner with local universities to explore the latest energy innovations		Narrative	• Envision RA0.0
E8.6: Consider energy storage technologies such as batteries for use during night time		Narrative, Calculations	• Envision RA0.0 • The Economics of Battery Energy Storage - Rocky Mountain Institute
E8.7: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines		Narrative	• Envision QL0.0, LD0.0, RA0.0, NW0.0, CR0.0

Materials (M)

Introduction

Incorporating durable, long-lasting, and innovative materials can help reduce the carbon footprint of a project, reduce ongoing maintenance and replacement costs, and often provide co-benefits. The use of durable materials is important to increase the life-cycle of a project and ensure a project's resilience in withstanding man-made and environmental impacts. Sustainable design may also manifest through incorporating conventional materials in new ways, or through innovative construction processes that facilitate a more efficient use of materials at a project site.

Strategies

M1	Use Durable Materials
M2	Reduce Air Pollutants
M3	Enhance Pavement Life-Cycle
M4	Reuse Materials on Project Site
M5	Provide for Deconstruction and Recycling
M6	Materials Innovation

Air quality can also be improved by incorporating materials that are non-toxic or low in volatile organic compounds (VOCs). In addition, nonrenewable resources and excess materials are often discarded and not utilized to their fullest capacity. The guidelines seek to encourage reuse of materials on-site and develop waste diversion goals for any deconstructed or excess materials that leave a project site. Using innovative processes and materials is important for encouraging best practices to ensure these strategies become commonplace for all relevant projects.

M1: Use Durable Materials

Intent: To increase the life of a product and reduce frequent replacement of a given product

Benefit: Reduce ongoing operations and maintenance costs, and reduce the use of nonrenewable materials

Action Items	Required	Documentation	Guidance / Reference
M1.1: Maximize recycled, durable, and reclaimed materials	✓	Plans, drawings, or specifications	• Envision RA1.3, LD3.3, RA1.7 • Energy Usage and Greenhouse Gas Emissions of Pavement Preservation Process for Asphalt Concrete Pavements
M1.2: Use rubberized asphalt concrete that lasts 50% longer than conventional asphalt concrete or equivalent with regards to durability		Plans, drawings, or specifications	• Envision LD3.3 • Highway Design Manual (Caltrans 2008): Chapter 630, Flexible Pavement

M2: Reduce Air Pollutants

Intent: To reduce air pollutants from construction materials

Benefit: Reduce impacts from toxic and hazardous materials, and improve air quality for the community

Action Items	Required	Documentation	Guidance / Reference
M2.1: Specify materials with low toxicity, minimal process emissions, low-VOC, recycled content, resource efficiency, recycled materials, reusable components, sustainable or locally sourced, moisture resistant, etc.	✓	Narrative	• Envision CR1.2, RA1.2, RA1.3, RA1.4, LD 2.1 • Environmental Assessment and Specification of Green Building Materials (Froeschle 1999) • CalRecycle's A Review of Construction Projects Using Sustainable Materials
M2.2: Comply with South Coast Air Quality Management District (SCAQMD) rules for Source Specific Standards and Toxics and Other Non-Criteria Pollutants	✓	Narrative	• Envision CR1.2 • SCAQMD Rulebook (Product Selection: Toxics Reduction)

M3: Enhance Pavement Life-Cycle

Intent: To increase the life and durability of pavement

Benefit: Reduce ongoing operations and maintenance costs, and reduce the use of nonrenewable materials

Action Items	Required	Documentation	Guidance / Reference
M3.1: Use pavement life-cycle cost analysis at a preliminary engineering level when pavement material is needed		Plans, drawings, or specifications	• Envision LD3.3 • Life-Cycle Cost Analysis Procedures Manual (Caltrans 2013)
M3.2: Use warm mix asphalt when applicable • Increase frequency of incidental maintenance, where applicable, to extend life-cycle of pavement • Decrease frequency of repaving where warranted • Include as a requirement depending on the size and cost of project		Plans, drawings, or specifications	• Envision LD3.3 • FHWA Warm Mix Asphalt Technologies and Research • California DOT Warm Mix Asphalt Authorized Material List

M4: Reuse Materials on Project Site

Intent: To maximize the use of existing materials and reduce the disposal of nonrenewable materials

Benefit: Reduce capital construction costs and the demand for additional nonrenewable materials

Action Items	Required	Documentation	Guidance / Reference
M4.1: Use Cold in Place Recycling (CIPR) and Cold Central Plant Recycling (CCPR) to reuse pavement materials in place		Plans, drawings, or specifications	• Envision RA1.3 • Caltrans' Cold In-Place Recycling guidelines • DPW's Cold Central Plant Recycling guidelines
M4.2: Stabilize and strengthen the existing base/subgrade materials in place by adding cement or lime to form Cement Stabilized Pulverized Base (CSPB) or Lime Stabilized Pulverized Base		Plans, drawings, or specifications	• Envision LD3.3 • 2015 Greenbook: Standard Specifications for Public Works Construction and Greenbook Standard Specifications 2016 Supplement

M5: Provide for Deconstruction and Recycling

Intent: To promote reuse and repurposing of materials or products

Benefit: Reduce the amount of materials or products sent to landfills and the need for additional nonrenewable resources

Action Items	Required	Documentation	Guidance / Reference
M5.1: Establish waste diversion goals for the project by identifying at least three materials targeted for diversion	✓	Narrative	• Envision RA1.5 • LEED v4 MR Prerequisite: Construction and Demolition Waste Management Planning
M5.2: Recycle and/or salvage nonhazardous construction and demolition materials, if applicable	✓	Narrative	• Envision RA1.5, RA1.7 • LEED v4 MR Credit: Construction and Demolition Waste Management Planning
M5.3: Use crushed miscellaneous base (CMB) whenever possible		Plans, drawings, or specifications	• Envision RA1.3, RA1.6 • Consider that many jurisdictions in Southern California do not permit the use of CMB in health sensitive facilities including medical facilities, schools, daycare facilities, etc. • Prefer a crushed aggregate base, which consists of all-natural crushed materials for sensitive areas
M5.4: For projects requiring substantial amounts of fill material, consult with Water Resources Division (WRD) and Flood Maintenance Division (FMD) for nearby sources of fill material		Narrative	• Envision RA1.4

M6: Materials Innovation

Intent: To encourage sustainable BMPs that are beyond code requirements and the efforts identified in these guidelines

Benefit: Reduce infrastructure's carbon footprint and improve efficiency and longevity of projects

Action Items	Required	Documentation	Guidance / Reference
M6.1: Use software to balance earthwork (assists a project through digitization of all documents that take volume measurements with ease using PDF drawings)		Plans, drawings, or specifications	• Envision RA1.4 • Case Study in Southern California of construction projects by Swinerton Builders • InRoads - Road Design and Analysis Software • Consult with WRD and FMD
M6.2: Use non-destructive testing methods, such as Falling Weight Deflectometer and Ground Penetrating Radar to evaluate existing flexible and rigid pavement structure; include foamed asphalt and Engineered Emulsion Stabilized Pulverized Base (EESPB)		Narrative	• Envision RA0.0 • Methods of Test to Obtain Flexible Pavement Deflection Measurements for Determining Pavement Rehabilitation Requirements (DOT 2004)
M6.3: Reduce the net embodied energy of project materials over the project life		Calculations	• Envision RA1.1
M6.4: Partner with local universities to explore and pilot new and innovative materials (self-healing concrete, biochar, water filtration systems, etc.)		Narrative	• Envision RA0.0
M6.5: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines		Narrative	• Envision QL0.0, LD0.0, RA0.0, NW0.0, CR0.0

Climate Mitigation and Resilience (CR)

Introduction

Climate change is already affecting communities in the County through impacts such as long-term drought, increased incidence of wildfires, intense rainstorms and flooding, decreased water quality, poor air quality, and extreme heat events. This chapter focuses on addressing climate mitigation (reduce GHG emissions) and adaptation (design for climate change).

Strategies

CR1	Identify GHG Emissions Reductions
CR2	Identify Climate Vulnerabilities
CR3	Design for a Changing Climate
CR4	Climate Mitigation and Resilience Innovation

Since 2009, the County has been working to implement climate change measures that benefit residents as well as reduce GHG emissions by providing resources for energy-efficient home upgrades, solar mapping, and climate action planning. The County's Healthy Design Ordinance is another example that promotes a healthy and active lifestyle by encouraging biking and walking to reduce vehicle miles traveled.

Several of the strategies found within the SIG contribute to reducing GHG emissions and can be quantified. The County has set a GHG reduction target of 11% below 2010 levels by 2020, and must comply with California's Assembly Bill 32 target of reducing GHG emissions to 1990 levels by 2020.

Climate resilience is also a critical design consideration for infrastructure projects. This includes understanding climate vulnerabilities and consideration of adaptation strategies. Otherwise, a variety of public health, safety, and economic impacts could be experienced with increased severity. As a way to improve micro-climate conditions, the County has also been working on LID features to reduce stormwater runoff, water pollution, and urban heat island effect. Looking at infrastructure projects with resiliency in mind should lead to a more cost-effective project over time as it will have been designed to operate in a changing environment.

CR1: Identify GHG Emissions Reductions

Intent: To identify and quantify project GHG emissions reduction strategies

Benefit: Ability to demonstrate project GHG emissions reductions

Action Items	Required	Documentation	Guidance / Reference
CR1.1: Identify which SIG strategies have been implemented that contribute to GHG reductions and categorize them into one of the following: • Transportation • Energy • Materials/waste • Water *A worksheet was developed to help project teams implement this action (see Appendix C)*	✓	Narrative	• Envision CR1.1 • List of County GHG reduction strategies to understand the County's priorities: Unincorporated Los Angeles County Community Climate Action Plan 2020 (County Department of Regional Planning 2015) (see Section ES.3, pgs. ES-2 – ES-6 for County Actions) • Energy Usage and Greenhouse Gas Emissions of Pavement Preservation Process for Asphalt Concrete Pavements • Appendix C – DPW's SIG GHG Emissions Reduction Worksheet
CR1.2: Quantify the reduction of GHG emissions for the project *A worksheet was developed to help project teams implement this action (see Appendix C)* *For larger projects, and those requiring an Environmental Impact Report, it is possible for this calculation to be completed by a consultant*		Calculations	• Envision CR1.1 • Appendix C – DPW's SIG GHG Emissions Reduction Worksheet

CR2: Identify Climate Vulnerabilities

Intent: To identify potential climate impacts that could cause asset damage and/or operational disruptions throughout the lifespan of the project

Benefit: Understand the climate vulnerabilities of the project

Action Items	Required	Documentation	Guidance / Reference
CR2.1: Collect climate science data relevant to the project site for the following impacts (as appropriate): • Heat events • Intense rainstorms and flooding • Wildfires • Extreme high-tide and storm surges related to sea level rise *The list above is based on California Adaptation Planning Guide - Defining Local & Regional Impacts by California Emergency Management Agency and California Natural Resources Agency*	✓	Narrative	• Envision CR2.1, CR2.2 • Coastal Flooding and Inundation Maps • Cal-Adapt: Temperature, Wildfire, Sea Level Rise Maps • California Adaptation Planning Guide - Defining Local and Regional Impacts • Preparing for Climate Change Impacts in Los Angeles: Strategies and Solutions for Protecting Local Communities
CR2.2: Determine the potential physical and/or operational impacts based on climate science data for 2030, 2050, and 2100 *Example: Increased precipitation during large storm events would increase the flow of stormwater into culverts by 2050*		Narrative	• Envision CR2.1, CR2.3 • Sea Level Rise Vulnerability Study for the City of Los Angeles
CR2.3: Complete climate vulnerability assessment of the project that addresses exposure, sensitivities, and adaptive capacity		Narrative	• Envision CR2.2 • Climate Change Vulnerability Assessment, Risk Assessment, and Adaptation Approaches • California Adaptation Planning Guide - Planning for Adaptive Communities
CR2.4: Conduct outreach to emergency management officials to discuss project and potential climate change impacts		Narrative	• Envision CR2.1

CR3: Design for a Changing Climate

Intent: To develop adaptation strategies to account for climate impacts for the lifespan of the project

Benefit: Develop a project design that is resilient to climate impacts

Action Items	Required	Documentation	Guidance / Reference
CR3.1: If project is vulnerable to climate impacts, develop, for consideration, a list of potential adaptation strategies (temporary and permanent) *Examples: Increase size of culverts to address increase precipitation, raise electrical equipment to address sea level rise, develop plan to provide temporary flood protection barriers to address storm surge, etc.*	✓	Narrative	• Envision CR2.3, CR2.4 • Tool for Calculating Stormwater to Infrastructure – use with Increased Water Load – EPA's National Stormwater Calculator • Addressing Climate Change Adaptation in Regional Transportation Plans - A guide for California MPO's and RTPA's (see Table 4-1 [pg. 52] for design strategies for certain impacts) • Case Studies and Frameworks for Addressing Adaptation in Transportation Projects - DOT Climate Adaptation Resources • Cost benefit guidance: U.S. Army Corps of Engineers and Federal Highway Administration (FHWA)
CR3.2: If project site is vulnerable to climate change impacts within its estimated lifespan, implement appropriate adaptation strategy to reduce or remove its vulnerability		Plans, drawings, or specifications	• Envision CR2.3, CR2.4

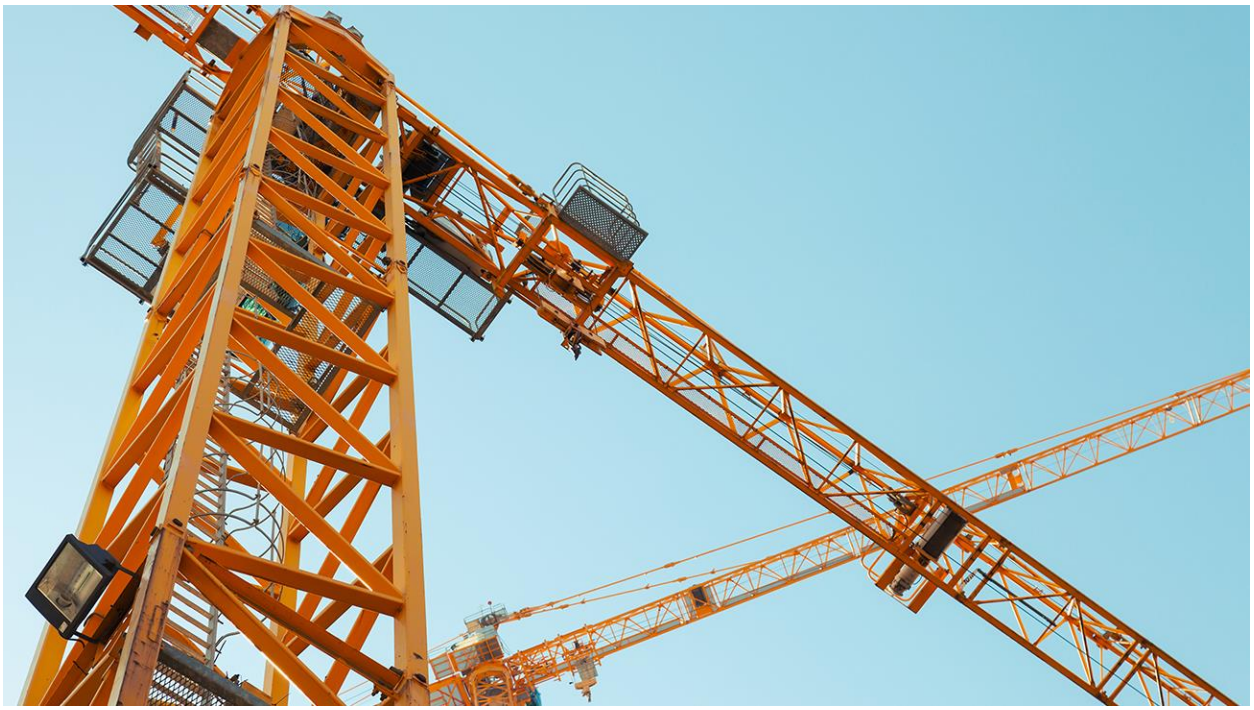
CR4: Climate Mitigation and Resilience Innovation

Intent: To encourage sustainable BMPs that are beyond code requirements and the efforts identified in these guidelines

Benefit: Implement sustainability practices that demonstrate innovative approaches and technologies

Action Items	Required	Documentation	Guidance / Reference
CR4.1: Implement an innovative pilot/demonstration project that addresses climate mitigation and/or resilience *Suggestions include: solar roadway technology for roads, crosswalks, parking lots, bike paths, micro-grid or off-grid technology, using sustainable fuels, etc.*		Narrative	• Envision CR0.0 • Climate Mitigation and Adaptation Actions in American Cities: A 282-City Survey (Mayors Climate Protection Center 2014) • Case Studies - Institute for Sustainable Infrastructure Envision Project Awards • Case Studies - Climate Adaptation Knowledge Exchange • American Society of Civil Engineers committee currently developing climate adaptation design procedures (not yet available)
CR4.2: Include consideration for climate change impacts on human health and well-being (at a minimum): • Cardio-respiratory health and mortality • Other temperature and air-quality-related health impacts • Food-, water-, and vector-borne diseases • Increased food insecurity/contamination of water supply *The list above is based on California Adaptation Planning Guide - Defining Local & Regional Impacts by California Emergency Management Agency and California Natural Resources Agency*		Narrative	• Envision QL2.1 • Impacts on Water, Health, Forests, Agriculture, and Native Americans - EPA's Climate Change Impacts • Framework for Addressing Climate Change in Los Angeles County (County Department of Public Health 2014) • California Adaptation Planning Guide - Planning for Adaptive Communities
CR4.3: Include consideration and mitigation of social and economic vulnerabilities (at a minimum): • Impacts on agricultural, forestry, and fishing sectors and employment • Impacts on tourism industry and employment • Permanent displacement, property damage or loss *The list above is based on California Adaptation Planning Guide - Defining Local & Regional Impacts by California Emergency Management Agency and California Natural Resources Agency*		Narrative	• Envision CR2.2 • Social Vulnerability to Climate Change in California (Pacific Institute 2012) • A Review of Social and Economic Factors that Increase Vulnerability to Climate Change Impacts in California (Pacific Institute 2010) • Climate Action for Health: Integrating Public Health into Climate Action Planning (County Department of Public Health 2012) • California Adaptation Planning Guide - Planning for Adaptive Communities
CR4.4: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines		Narrative	• Envision QL0.0, LD0.0, RA0.0, NW0.0, CR0.0

Construction (C)



Introduction

Managing the construction process from a regulatory, planning, and program approach is essential to manage, mitigate, and monitor environmental impacts. From CEQA, to more localized Mitigation Monitoring and Reporting Programs (MMRPs), there are processes in place to ensure that construction impacts are managed effectively.

Specific construction activities, such as trucking of materials, waste and recycling management, dust mitigation and compaction, and equipment selection, can also be managed to mitigate impacts on the natural and built environment.

This section provides recommendations for process improvements through the contract document and the project management process. This will encourage innovation through the introduction of more sustainable materials and sustainability planning by both the project team and the construction entity selected for the project.

Strategies

C1	Minimize Pollution from Construction Activity
C2	Manage Waste and Recycling
C3	Minimize Trucking
C4	Protect Existing Natural Systems
C5	Reduce Noise and Vibration
C6	Reduce Air Pollutants
C7	Incorporate Climate and Risk into Construction Plans
C8	Minimize Resource Consumption during Construction
C9	Construction Innovation

C1: Minimize Pollution from Construction Activity

Intent: To control emissions from construction equipment

Benefit: Reduce carbon footprint of project during construction process

Action Items	Required	Documentation	Guidance / Reference
C1.1: Incentivize the contractor selection process based on emissions/energy use thresholds of construction equipment and process in contract documents		Plans, drawings, or specifications	• Envision RA1.2 • SITES Construction Prerequisite 7.1 • Threshold reduction guidelines: (25%, 50%, 75%, 100%) • Metro's Green Construction Equipment Initiative
C1.2: Establish training program for project management/construction management (PMCM)		Narrative	• SITES Education Credit 9.1

C2: Manage Waste and Recycling

Intent: To maximize the use of existing materials and reduce the disposal of nonrenewable materials

Benefit: Optimize the reuse or recycling of materials from project site

Action Items	Required	Documentation	Guidance / Reference
C2.1: Divert waste from landfills; document the quantifiable waste and destination of waste exported from site	✓	Calculations and narrative	• Envision RA1.5 • SITES Construction Credit 7.5, 7.6 • Threshold reduction guidelines: (50%, 80%, 95%) • County Code 20.87: Construction and Demolition Debris Recycling and Reuse Ordinance • CalRecycle Facility Information Toolbox (FacIT)
C2.2: Reduce excavated materials taken off-site; when appropriate, allow on-site material to be reused as backfill or embankment		Narrative	• Envision RA1.5 • LEED v4 MR Credit: Construction and Demolition Waste Management Planning • SITES Construction Credit 7.6 • County Code 20.87: Construction and Demolition Debris Recycling and Reuse Ordinance
C2.3: Minimize sediment trash and construction debris from leaving site		Calculations and narrative	• SITES Construction Prerequisite 7.2 • CASQA's Stormwater BMP Best Management Practice Handbook: New Development and Redevelopment

C3: Minimize Trucking

Intent: To effectively manage movement of materials during the construction process

Benefit: Reduce the carbon footprint and potential traffic generated during construction

Action Items	Required	Documentation	Guidance / Reference
C3.1: Streamline efficient use of truck trips during construction	✓	Narrative	• Envision CR1.1 • SITES Construction Prerequisite 7.2 • SITES Construction Credit 7.7
C3.2: Establish sufficient site areas available for contractor stockpiles and storage to minimize extent of trucking required		Plans, drawings, or specifications	• SITES Construction Prerequisite 7.2 • SITES Construction Credit 7.7

C4: Protect Existing Natural Systems

Intent: To ensure natural resources are managed effectively during construction

Benefit: Minimize project impacts on the natural environment during construction

Action Items	Required	Documentation	Guidance / Reference
C4.1: Control water usage for dust, and incorporate alternative methods for dust mitigation and compaction	✓	Narrative	• Envision RA3.2 • SITES Construction Prerequisite 7.2 • SITES Construction Credit 7.7 • SITES Water Credit 3.4
C4.2: Avoid staging materials under trees or on sensitive soil to minimize project impacts on the natural environment during construction		Narrative	• SITES Construction Prerequisite 7.3

C5: Reduce Noise and Vibration

Intent: To control negative impacts from construction equipment and processes

Benefit: Minimize project noise and vibration impacts on the surrounding community during construction

Action Items	Required	Documentation	Guidance / Reference
C5.1: Use the least disruptive of technologies available (while being cost effective) for maintenance or replacement, repair or rehabilitation of existing stormwater, sanitary sewer, or combined storm/sewer lines	✓	Plans, drawings, or specifications	• Envision QL2.2 • SITES Construction Prerequisite 7.2 • 2016 CEQA Statute and Guidelines: CEQA Noise and Vibration Guidelines
C5.2: Clearly identify hours of work restrictions in Request for Proposal and enforce requirements on project site (if applicable and not already included in construction specifications)		Narrative	• SITES Construction Prerequisite 7.2

C6: Reduce Air Pollutants

Intent: To reduce air pollutants in project design and construction

Benefit: Improve air quality for the community

Action Items	Required	Documentation	Guidance / Reference
C6.1: Comply with California Ambient Air Quality Standards (CAAQS)	✓	Narrative	• Envision CR1.2 • CAAQS • CAAQS Sections: - Design: Energy and Fuel Use - Construction: Diesel Activities, Fugitive Dust, and Portable Equipment Sections
C6.2: Specify Alternative fuel construction equipment		Plans, drawings, or specifications	• Envision CR1.2 • SITES Construction Credit 7.7 • Clean Construction USA - Alternative Fuels Data Center (DOE)

C7: Incorporate Climate and Risk into Construction Plans

Intent: To facilitate comprehensive contingency management for projects during construction

Benefit: Mitigate and manage potential project impacts in a proactive and efficient manner

Action Items	Required	Documentation	Guidance / Reference
C7.1: Require submittal of construction contingency plans in case of natural disasters (e.g., rain, earthquake, fire) or if work itself poses significant risk (e.g., dam modifications, major hillside stabilizations)		Narrative	• Envision CR2.2 • SITES Construction Prerequisite 7.1

C8: Minimize Resource Consumption during Construction

Intent: To minimize the use of energy, potable water, and materials during construction

Benefit: Reduce dependence on natural resources

Action Items	Required	Documentation	Guidance / Reference
C8.1: Determine water needs based on construction processes/activities and identify alternatives to potable water use (such as recycled water for dust control and concrete production)		Narrative	• LADWP Water Recycling-Recycled Water User Guidelines: Dust Control
C8.2: Specify ENERGY STAR equipment		Plans, drawings, or specifications	• ENERGY STAR Certified Products
C8.3: Install daylight/occupancy sensor controls in field offices		Plans, drawings, or specifications	• Lawrence Berkeley National Laboratory- Sensors & Controls
C8.4: Work with suppliers that collect unused materials/packaging or have take-back programs		Narrative	• CalRecycle - Carpet Materials

C9: Construction Innovation

Intent: To encourage sustainable BMPs that are beyond mandated requirements and the efforts identified in these guidelines

Benefit: Reduce the impact on the natural and built environment

Action Items	Required	Documentation	Guidance / Reference
C9.1: Integrate sustainable construction practices as part of contractor best value selection: • Establish a comprehensive work plan detailing the contractors' plan and schedule milestones where relevant for compliance assessment on each aspect of the plan, and oversight for protecting key natural resources on or adjacent to the project site • Establish quantifiable measures with line item dollar values in the schedule of values		Narrative	• SITES Education Credit 9.3
C9.2: Gain industry input by requesting alternative submittals for more energy efficient/sustainable materials and processes as part of contract process, and take advantage of positive industry input		Narrative	• Envision CR1.1, RA1.2
C9.3: Work with trade organizations such as the Business Industry Association (BIA) to understand the latest BMPs in construction techniques		Narrative	• BIA of Southern California
C9.4: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines		Narrative	• Envision QL0.0, LD0.0, RA0.0, NW0.0, CR0.0

Operations and Maintenance (OM)

Introduction

The ongoing operations and maintenance of a project will most often have the most persistent impact on its performance and longevity. Critical in this process is the engagement of a life-cycle perspective that focuses on the evaluation of the initial project budget in light of longer-term sustainable practice and operational efficiencies.

A life-cycle cost approach is particularly critical and effective wherein an entity, like the County, engages in long-term asset ownership and operations.

To ensure that a project's sustainability features can be maintained, early stakeholder collaboration to establish funding and performance measures will be critical to a project's success over time. Optimizing key systems over time will also ensure that projects are operating at their highest efficiency, which is essential to promoting preventative maintenance, as well as reducing early replacement costs and labor hours required to complete unanticipated rehabilitation work.

Strategies

OM1	Plan for Long-Term Monitoring and Maintenance
OM2	Promote Preventative Maintenance
OM3	Establish Asset Class Performance and Maintenance
OM4	Establish Funding
OM5	Reduce Pesticides and Fertilizers
OM6	Reduce Air Pollutants
OM7	Operations and Maintenance Innovation

This section includes several strategies that go beyond design and the implementation may be outside the scope (and control) of the design team. Nevertheless, these strategies are a part of a whole systems approach to minimize impacts on a project.

OM1: Plan for Long-Term Monitoring and Maintenance

Intent: To promote a state of good repair and maximize the life of infrastructure assets

Benefit: Optimize ongoing functionality, reliability, and performance to maximize investments in infrastructure assets

Action Items	Required	Documentation	Guidance / Reference
OM1.1: Develop Maintenance Plan/Manual (including for bioretention/bioswales, if relevant)	✓	Narrative	• Envision LD3.1, LD3.3 • SITES O+M Prerequisite 8.1
OM1.2: Identify entities responsible for long-term maintenance; determine roles and responsibilities of entities for the long-term operations and maintenance of the work and its related equipment	✓	Narrative	• Envision LD3.1, LD3.3 • SITES O+M Prerequisite 8.1
OM1.3: Develop an ongoing inspection schedule including performance monitoring prior to end of warranty period	✓	Narrative	• Envision LD3.1, LD3.3 • SITES O+M Prerequisite 8.1
OM1.4: Require initial training for care of systems and unique materials from the contractor, including video of training sessions		Narrative	• Envision QL1.3 • SITES Education Credit 9.1
OM1.5: Develop a "lessons learned" forum and update the maintenance plan and/or training to address issues to maintain asset longevity and optimize performance		Narrative	• SITES Education Credit 9.2 • SITES Education Credit 9.3

OM2: Promote Preventative Maintenance

Intent: To promote a state of good repair and maximize the life of infrastructure assets

Benefit: Reduce costs of differed maintenance and associated risks for deteriorating assets

Action Items	Required	Documentation	Guidance / Reference
OM2.1: Utilize pavement condition index (PCI) score for different projects (e.g., roads) to prioritize maintenance or utilize pavement management software to prioritize pavement maintenance	✓	Plans, drawings, or specifications	• Envision LD3.1, LD3.3 • SITES O+M Prerequisite 8.1 • Practical Guide for Quality Management of Pavement Condition Data Collection
OM2.2: Establish integrated database of asset management, including inspections, maintenance and repair schedules and responsibilities (budget/labor/contracting), and develop a comprehensive program for upkeep of County assets. Maintain asset tracking system reflecting current conditions and related upkeep activities		Narrative	• SITES O+M Prerequisite 8.1
OM2.3: Establish a "useful life" for routine repair and refurbishment of County assets and overlay these requirements into integrated database and county budgeting process		Narrative	
OM2.4: Establish uniform training for County's life-cycle inspection and maintenance of typical asset classes		Narrative	• SITES Education Credit 9.1

OM3: Establish Asset Class Performance and Maintenance

Intent: To assess performance of relevant systems and materials

Benefit: Optimize performance and maximize investment in infrastructure assets

Action Items	Required	Documentation	Guidance / Reference
OM3.1: Incorporate performance measures into operations and maintenance procedures	✓	Narrative	• Envision LD3.1, LD3.3 • SITES O+M Prerequisite 8.1
OM3.2: Develop threshold maintenance condition indexes to evaluate asset class conditions such as using the PCI example		Narrative	• SITES O+M Prerequisite 8.1

OM4: Establish Funding

Intent: To provide needed resources to complete required operations and maintenance for each project

Benefit: Ensure ongoing operations and maintenance can be completed and assets remain in a state of good repair

Action Items	Required	Documentation	Guidance / Reference
OM4.1: Identify or establish funding mechanisms and allocations for ongoing operations and maintenance	✓	Narrative	• Envision LD3.1
OM4.2: Change asset budget and management process to provide adequate funding for regular interval maintenance and repairs		Narrative	• Envision LD3.1

OM5: Reduce Pesticides and Fertilizers

Intent: To control pest problems while minimizing risks to humans and the environment

Benefit: Manage pest populations in an environmentally beneficial way to optimize the performance of a project

Action Items	Required	Documentation	Guidance / Reference
OM5.1: Implement an integrated pest management plan that supports policies affecting fertilizer and pesticide use within the County		Plans, drawings, or specifications	• Envision NW2.2 • SITES O+M Credit 8.4

OM6: Reduce Air Pollutants

Intent: To reduce air pollutants during operations and maintenance

Benefit: Improve air quality for the community

Action Items	Required	Documentation	Guidance / Reference
OM6.1: Comply with CAAQS	✓	Narrative	• Envision CR1.2 • CAAQS • CAAQS Sections: - Operations and Maintenance: Diesel Equipment, and Energy and Fuel Use
OM6.2: Comply with SCAQMD rules for Source Specific Standards and Toxics and Other Non-Criteria Pollutants *Not Required: SCAQMD Compliance Documents*		Narrative	• Envision CR1.2 • SCAQMD Rulebook • SCAQMD Sections: - Operations and Maintenance: Work Trip Reduction, Mobile Source and Off-Road Source Offset
OM6.3: Purchase alternative fuel maintenance vehicles and equipment		Plans, drawings, or specifications	• Envision CR1.1, CR1.2 • Alternative Fuels Vehicle Program (AFVP)

OM7: Operations and Maintenance Innovation

Intent: To ensure efficient and optimized operations and maintenance

Benefit: Minimize cost of operations and maintenance while increasing performance

Action Items	Required	Documentation	Guidance / Reference
OM7.1: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines		Narrative	• Envision LD3.3, RA2.3

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Small Buildings (SB) Sustainability Strategies

Introduction

This chapter applies to all small building projects (between 1,000 to 10,000 SF conditioned floor area). Refer to the Implementation chapter for additional details regarding applicability and exemptions.

The Los Angeles County Green Building Standards Code (Title 31) requires compliance with CALGreen for all projects over 1,000 SF. In addition, DPW capital building projects that are over 10,000 SF are required to achieve LEED Gold certification. Building projects less than 10,000 SF are requested to implement sustainable BMPs, yet no guidance has been provided.

Strategies

SB1	Comply with County Green Building Standards Code
SB2	Achieve Targeted CALGreen Tier 1 Measures
SB3	Achieve DPW-Specific Actions
SB4	Small Buildings Innovation

This chapter establishes minimum sustainability performance requirements for small buildings that are based on the CALGreen framework. The Code (Title 31) already requires compliance with CALGreen mandatory measures. These guidelines focus on achieving a selection of CALGreen Tier 1 voluntary measures and additional sustainability actions that are specific to DPW. A detailed energy study was completed for the two major climate zones (CZs) in the County (CZ 9 & CZ 16) to highlight the appropriate energy conservation measures (ECMs) based on return on investment (ROI).

These small building guidelines recognize that DPW includes a unique building stock, and therefore, focuses on the following typologies: warehouse, office, workshop/maintenance shop, storage building, and residence.

An integrative design worksheet (IDW) has also been developed to assist project teams to comply with the guidelines and implement the strategies (see Appendix B).

SB1: Comply with County Green Building Standards Code

Intent: To provide guidance to meet the County's green building code requirements

Benefit: Assure that minimum sustainable planning, design, and construction practices are incorporated into small building projects

Action Items	Required	Documentation	Guidance / Reference
SB1.1: Comply with all requirements identified in the County Plan Review list	✓	Plans, drawings, or specifications	• LA County Plan Review list under Green Building section • LA County Code of Ordinances - Green Building Standards - Title 31 • 2016 Green Building Standards Code, Part 11 (CALGreen)

SB2: Achieve Targeted CALGreen Tier 1 Measures

Intent: To provide guidance to incorporate sustainability strategies encouraged by the State

Benefit: Implement sustainable planning, design, and construction practices that are beyond minimum code requirements and support reaching CALGreen Tier 1 Status

Note: Must achieve all (required and not required) action items mentioned below to meet CALGreen Tier 1

	Action Items *(CALGreen reference section in parenthesis)*	Required	Documentation	Guidance / Reference
Planning / Design	SB2.1: (A5.106.11) Heat island effect *(Hardscape alternatives and cool roof)*	✓	Plans, drawings, or specifications	• LEED v4 SSc5 • Does not apply to existing buildings undergoing alterations • Cool Roof Rated Products Directory • ENERGY STAR Certified Roof Products • Low slope roof SRI > 75 • Steep slope roof SRI > 16 • Site initial solar reflectance of min. 30 • Site strategies include light-colored pavement, painting, open grid or pervious/permeable pavement, etc.
	SB2.2: (5.106.5.2) Designated parking for clean air vehicles *(Approx. 10% of total spaces)*		Plans, drawings, or specifications	• Electric Vehicle Charging Station Program and Installation Guidelines (County of Sonoma 2011) • New York State Energy Research and Development Authority's Best Practice Guides for Charging Stations
	SB2.3: (5.106.5.3) Electric Vehicle (EV) charging for future installation of electric vehicle supply equipment (EVSE) *(Approx. 8% of total spaces)*		Plans, drawings, or specifications	• DOE - Developing Infrastructure to Charge Plug-In Electric Vehicles
Energy	SB2.4: (A5.203.1.1.1) Outdoor Lighting *(Min. 10% outdoor lighting energy saving)*	✓	Calculations	• LEED v4 EAp2, EAc2 • Use ENERGY STAR qualified fixtures or LEDs • Nonresidential Lighting and Electrical Power Distribution Guide for 2016 Building Energy Efficiency Standards - California Lighting Technology Center
	SB2.5: (A5.211.1) On-site renewable energy and documentation *(PV amount = 1% of gas/propane + 1% electrical energy use)*		Plans, drawings, or specifications, calculations	• LEED v4 EAc5 • To be included where feasible • Storage buildings less than 2,000 SF are exempt

	Action Items *(CALGreen reference section in parenthesis)*	Required	Documentation	Guidance / Reference
	SB2.6: (A5.203.1.2) Energy savings over baseline *(5% for projects including lighting or mechanical systems and 10% for projects including lighting and mechanical systems)*		Calculations	• LEED v4 EAp2, EAc2 • Title 24, Part 6, Section 140.1 Performance Approach: Energy Budgets
Water	SB2.7: (A5.303.2.31) Indoor potable water use reduction *(12% reduction by either prescriptive or performance method)*	✓	Calculations	• LEED v4 WEp2,WEc2 • Baseline water use and water use reduction table - Worksheets WS-1 and WS-2 (CALGreen Chapter 8)
	SB2.8: Comply with one elective measure selected from Division 5.3: Water Efficiency and Conservation	✓	Narrative	List of CALGreen elective measures: • (A5.303.3) Appliance and fixture commercial applications • (A5.303.4) Water conserving plumbing and fixtures (faucets and fountains) • (A5.303.5) Dual plumbing • (A5.304.2) Outdoor water use-install meters • (A5.304.6) Restoration of areas disturbed by construction • (A5.304.7) Previously developed sites • (A5.304.8) Graywater irrigation system • (A5.305) Water reuse (via non potable water systems, irrigation systems)
Materials / Resources	SB2.9: (A5.405.1) Regional materials *(Sourcing within 500 miles of project site, 10% of total material cost)*	✓	Narrative, calculations	• LEED v4 MRc3 • Does not apply to specialty products/materials/equipment • Identify the main building products/materials and identify a list of regional manufacturers
	SB2.10: (A5.405.2.1) Bio-based materials - Certified wood products *(50% bio-based content)*	✓	Plans, drawings, or specifications	• LEED v4 MRc3 • Specify Forest Stewardship Council-certified, or equivalent
	SB2.11: (A5.405.4) Recycled content - Tier 1 *(10% of total material cost of project)*	✓	Plans, drawings, or specifications, calculations	• LEED v4 MRc3 • GSA Sustainable Facilities Tool
	SB2.12: (A5.405.5.2.1) Supplementary cementitious materials (SCMs) *(Examples: fly ash, slag cement, silica fume in concrete)*	✓	Plans, drawings, or specifications	• LEE v4 MRc4 • GSA Sustainable Facilities Tool
	SB2.13: (A5.406.1.1) Service life *(References materials)*	✓	Plans, drawings, or specifications	• LEED v4 MRc1 • Consider extended warranties • At a minimum, service life requirements: - Roof = 20-30 years *Asphalt roof=20 yrs* *Metal roofing=30 yrs* *Concrete tile roof=30 yrs* - HVAC = *Variable Refrigerant Flow system=20 yrs* *Package units=15 yrs* *Central plant=30 yrs* - Glazing = *50 yrs (same as building)* - *Operable windows are generally designed for 10-20 years (due to warranty only provide for 10-20 years)*

	Action Items *(CALGreen reference section in parenthesis)*	Required	Documentation	Guidance / Reference
Materials / Resources				- Asphalt = *20-30 yrs (typical parking lot-30 years, heavy commercial use 20 years)* - Generally, all other systems are designed per the building life of 50 years
	SB2.14: (5.407.2.2.2) Flashing *(Integrate with drainage plane)*	✓	Plans, drawings, or specifications	• White Paper on Understanding Drainage Planes - by Joseph W. Lstiburek (ASHRAE Journal, February 2006)
	SB2.15: (A5.408.3.1.1) Enhanced construction waste reduction–Tier 1 *(Min. 65% diversion)*	✓	Narrative, calculations	• LEED v4 MRp2, MRc5 • Refer to current Environmental Programs Division (EPD) Ordinance - Discuss plan and verification with EPD • Consider working with haulers that demonstrate high recycled content %: Clean LA
Environmental Quality	SB2.16: (A5.504.4.7.1) Resilient flooring systems, Tier 1 and verification of compliance *(90% of floor)*	✓	Plans, drawings, or specifications, calculations	• LEED v4 EQc2 • GSA Sustainable Facilities Tool
	SB2.17: (A5.504.4.8) Thermal insulation, Tier 1 *(Low VOC)*	✓	Plans, drawings, or specifications	• GSA Sustainable Facilities Tool • UL Energy Efficient Product Database
	SB2.18: (A5.504.4.9) Acoustical ceilings and wall panels and verification of compliance *(Low VOC)*	✓	Plans, drawings, or specifications	• LEED v4 EQc9 • Applies where type of products are used • Must meet the requirements of SCAQMD Rule 1113, Architectural Coatings • GSA Sustainable Facilities Tool
	SB2.19: (A5.504.5.3.1) Filters, Tier 1 *(Minimum Efficiency Reporting Value -[MERV] 11)*	✓	Plans, drawings, or specifications	• LEED v4 EQc1 • Does not apply to existing HVAC systems • ANSI/ASHRAE Standard 52.2 • Understanding MERV: National Air Filtration Association User's Guide for ANSI/ASHRAE Standard 52.2-2012
	SB2.20: (A5.507.1.1.1) Lighting *(Individual task lighting for 90% of occupants)*	✓	Plans, drawings, or specifications, calculations	• LEED v4 EQc6 • Illuminating Engineering Society (IES) Lighting Handbook, Tenth Edition • Advanced Lighting Guidelines • Lighting Controls Association (LCA) administered by the National Electrical Manufacturers Association (NEMA)
	SB2.21: (A5.507.1.2) Multi-occupant spaces *(Lighting & thermal comfort controls for all shared spaces)*	✓	Plans, drawings, or specifications	• LEED v4 EQc5, EQc6 • IES Lighting Handbook, Tenth Edition • Advanced Lighting Guidelines • Lighting Controls Association (LCA) administered by the National Electrical Manufacturers Association (NEMA) • ASHRAE 55-2013 (Thermal comfort) • ASHRAE 62.1 2016 (Ventilation)
	SB2.22: (A5.508.1.3) Hydrochlorofluorocarbons (HCFCs) *(Avoid HCFCs)*	✓	Plans, drawings, or specifications	• LEED v4 EAp3, EAc4 • Significant New Alternatives Policy (SNAP) Program by EPA

SB3: Achieve DPW–Specific Actions

Intent: To introduce sustainable design strategies that have been developed specifically for the DPW

Benefit: Implement sustainable BMPs that have been identified as a priority by DPW

	Action Items	Required	Documentation	Guidance / Reference
Planning and Design	SB3.1: Use the IDW to implement sustainability strategies *(Hold a sustainability kick-off meeting at the start of the project and include sustainability in each meeting agenda)*	✓	Narrative	• LEED v4 IPc1 • SIG IDW (Appendix B)
	SB3.2: Incorporate Sustainability Educational Signage	✓	Plans, drawings, or specifications	• Applies to publicly occupied spaces • Work with signage department to ensure approval
	SB3.3: Evaluate Funding Opportunities *(grant/incentive programs that would support sustainability strategies)*		Narrative	• Possible funding streams: - Energy Upgrade California - Savings by Design - California Solar Initiative Rebates - SoCal WaterSmart Commercial rebates
	SB3.4: Open ENERGY STAR Portfolio Manager Profile to track energy and water use consumption *(where feasible)*		Narrative	• ENERGY STAR Portfolio Manager
Energy	SB3.5: Evaluate and Incorporate Energy Efficiency Measures identified in the ECM Matrix *(see end of section)*	✓	Narrative	• LEED v4 EAc2 • Reference the ECM matrix, which was developed based on technical expertise and building energy analysis
	SB3.6: Specify ENERGY STAR Appliances and Lights Wherever Applicable *(LED light fixtures for specific building types - office, residence)*		Plans, drawings, or specifications	• LEED v4 EAc2 • Provide where feasible • ENERGY STAR Certified Products database
Water	SB3.7: Water Efficient Landscaping *(Reduce potable water use by 30% through plant selection and system)*	✓	Plans, drawings, or specifications	• LEED v4 WEp1 • Water-Smart Landscapes (EPA) • California Model Water Efficient Landscape Ordinance (MWELO)
	SB3.8: Incorporate High-Efficiency Irrigation and Weather Forecasting	✓	Plans, drawings, or specifications	• LEED v4 WEc1 • California Model Water Efficient Landscape Ordinance (MWELO) • Install WaterSense® Labeled Weather-Based Irrigation Controllers • Utilize high-efficiency nozzles with average distribution uniformity of at least 0.70. This may include conventional rotors, multistream rotors, or high-efficiency spray heads. • Use drip irrigation for at least 50% of landscape planting beds to minimize evaporation
Materials	SB3.9: Material Ingredient Disclosures *(Give preference to materials with environmental product declarations [EPDs] and health product declarations [HPDs])*		Narrative	• LEED v4 MRc2 • LEED BPDO Calculator
	SB3.10: Complete building material LCA study using publicly available software *(such as ATHENA, BEES, etc.)*		Calculations	• LEED v4 MRc1 • Athena - Impact Estimator • BEES (Building for Environmental and Economic Sustainability)

SB4: Small Buildings Innovation

Intent: To encourage sustainable measures that are beyond code requirements and the efforts identified in these guidelines

Benefit: Encourages the design of high performance buildings that reduce the overall impact on the natural and built environment

Action Items		Required	Documentation	Guidance / Reference
Planning & Design	SB4.1: Incorporate sustainable design strategies in prefab or modular buildings		Narrative	• Applies to buildings that were intended to be temporary but last longer than 5 years
	SB4.2: Complete LEED: Building Operations and Maintenance (O+M) checklist and consider pursuing certification		Narrative	• USGBC's LEEDv4 for Existing Buildings: Operations & Maintenance • LEED v4 Building Operations and Maintenance checklist
	SB4.3: Achieve exemplary performance levels for any actions identified in planning and design *(SB2 and SB3)*		Narrative	
Energy	SB4.4: Evaluate the energy efficiency measures identified in the ECM matrix as "Innovative/Other Strategies"		Narrative	• LEEDv4 EAc2 • Reference the ECM matrix, which was developed based on technical expertise and building energy analysis
	SB4.5: Conduct a feasibility analysis for Net Zero Energy and/or solar battery storage		Narrative	• The Technical Feasibility of Zero Net Energy Buildings in California report • Oregon Sustainability Center - Feasibility Study
	SB4.6: Achieve exemplary performance levels for any actions identified in Energy *(SB2 and SB3)*		Narrative	
Water	SB4.7: Conduct a feasibility analysis for Net Zero Water		Narrative	• Oregon Sustainability Center - Feasibility Study
	SB4.8: Achieve exemplary performance levels for any actions identified in Water *(SB2 and SB3)*		Narrative	
Materials	SB4.9: Conduct a feasibility analysis for Net Zero Waste		Narrative	• CalRecycle - Zero Waste • Oregon Sustainability Center - Feasibility Study
	SB4.10: Achieve exemplary performance levels for any actions identified in Materials *(SB2 and SB3)*		Narrative	
Environmental Quality	SB4.11: Evaluate potential climate change stressors, impacts, and resilience		Narrative	• Identify the key vulnerabilities and address the most significant climate risks in the project design • LEED pilot credits IPpc98,99,100 • Resilient Design Institute
	SB4.12: Achieve exemplary performance levels for any actions identified in Environmental Quality *(SB2 and SB3)*			

Energy Conservation Measure (ECM) Matrix

The ECM Matrix was developed to support strategy SB3.5: Evaluate and Incorporate Energy Efficiency Measures. The ECMs are based on technical expertise and building energy analysis that are specific to LA County climate zones.

Priority ECMs (Ranked on Cost)						
	ECM Strategies	**Office**	**Warehouse**	**Workshop/ Maintenance**	**Storage**	**Residence**
1	Optimize solar orientation	x	x	x	x	x
2	Window-to-wall ratio (Window 40%, Wall 60%)	x				x
3	Shading (overhangs up to 4 ft)	x	x	x	x	x^1
4	Low-flow fixtures (reduces hot water demand)	x		x		x
5	Maximize daylight (top and side lighting as per energy code)	x	x	x		x
6	Natural ventilation (operable windows)	x^1	x	x^1	x^1	x^3
7	Mixed mode ventilation (HVAC + operable windows)	x	x		x	x
8	Interior Lighting (avoid over lighting & use high efficacy, e.g., LED)	x^3	x^3	x^3	x^3	x
9	Lighting controls (daylight & occupancy sensors)	x^3	x	x^3	x^1	x
10	Task lighting (for at least 90% of building occupants)	x^3				
11	Exterior lighting - LED	x	x	x	x	x
12	Gravity driven fans		x			
13	Economizers (when applicable)	x	x	x	x	
14	High performance glazing	x				
15	Demand control ventilation	x	x	x		x
16	Envelope insulation (80% additional insulation)	x^2	x	x^2	x	x^2
17	Hot water heater efficiency (e.g., >80% annual fuel utilization efficiency)	x				x
18	*Solar thermal water heater (residential)*					x
19	*Higher equipment efficiency (e.g., >14 SEER)*	x	x	x	x	x
20	*Equipment controls (building management system)*	x	x	x	x	
21	System type selection (e.g., variable refrigerant flow w/heat recovery)	x				
22	Photovoltaic System (PV)	x^3	x^3	x^3	x^3	x^3

Innovative / Other Strategies

- Heat recovery
- Earth tube system
- Anidolic lighting system (light tube)
- Individual control for HVAC system (for at least 50% of building occupants)
- Personal comfort system
- User-centered thermal control using mobile technology
- Bio-sensing adaptive environmental control
- Solar activated façade
- Micro wind turbines
- Solar tubes

x^1 = Measures recommended based on ROI in CZ9
x^2 = Measures recommended based on ROI in CZ16
x^3 = Measures recommended based on ROI in CZ9 & CZ16

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Appendix A: Integrative Design Worksheet for Infrastructure

Introduction

This integrative design worksheet (IDW) has been developed as an in-house tool for DPW staff to evaluate sustainability strategies for infrastructure projects.

As part of the DPW SIG, DPW infrastructure projects are required to:

1. Achieve required actions
2. Evaluate recommended actions and implement if feasible
3. Consider innovative strategies that go beyond business as usual

It is recommended that the design team, with stakeholders, complete this worksheet at the start of a project. This worksheet shall then be reviewed/updated, as necessary, throughout the life of the project. An explanation shall be provided for all mandatory actions, which are applicable, but cannot be achieved.

This worksheet is set up as follows:

- Basic Project Information
- Sustainability Discussion Topics
  - Integrative Design
  - Site
  - Water
  - Energy
  - Materials
  - Climate Mitigation and Resilience
  - Construction
  - Operations and Maintenance

Once completed, this worksheet is to be included with the project files as supplemental information.

LA County Department of Public Works Sustainable Infrastructure Guidelines
Integrative Design Worksheet

Project Name:			**Date:**
Project Type:			**Project ID:**
Project Manager:			
Design Phase Submission:	☐ Concept ☐ 60% ☐ 90% ☐ 100% ☐ Other :		
Completed By (include email):			**Email:**

☐ Exempt ☐ Unable to comply

If any of the above selected, provide supporting narrative here

	Strategy and Actions	R	Achieved Y	Achieved N	Achieved NA	Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports Envision®
Integrative Design	**ID1: Hold Sustainability Kick-Off Meeting**							
	ID1.1: Use the IDW to implement sustainability strategies; identify the unique characteristics, opportunities, and constraints of the project site; and identify pre-existing conditions if applicable	X						LD1.1, LD1.3
	ID1.2: Outline key project parameters including the design intent, project stakeholders, scope, budget, and schedule	X						LD1.1, LD1.3
	ID2: Promote Stakeholder Engagement							
	ID2.1: Update the IDW at key project milestones with stakeholders	X						LD1.3
	ID2.2: Coordinate early with agencies, organizations, departments, and DPW divisions	X						LD1.3
	ID2.3: Establish recordkeeping to encourage and facilitate information sharing across all divisions	X						LD1.2
	ID2.4: Coordinate early with third-party approvers such as: Southern California Edison, the Fire Department, and/or other key entities	X						LD1.1
	ID2.5: Incorporate public outreach							LD1.4
	ID3: Incorporate Complete Streets							
	ID3.1: Integrate Complete Streets, where feasible, to facilitate the consideration and inclusion of bicycle, pedestrian, and transit modes in project strategies and performance measures	X						QL2.4
	ID3.2: Identify the project's "context zone" through three considerations: (1) development patterns (urban, suburban, rural), (2) land uses, and (3) special district considerations to determine the appropriate amenities to include for the project							LD2.2
	ID3.3: Identify project team bicycle and pedestrian coordinator(s) to serve as advisor(s) and external liaison(s) to ensure project coordination and input from local agencies and stakeholders							LD1.3, LD1.4
	ID4: Incorporate Sustainability Awareness							
	ID4.1: Incorporate a minimum of three educational components (e.g., signage, dashboard)							QL1.1
	ID4.2: Facilitate partnerships and extend sustainability education to local community groups							QL1.1
	ID5: Integrative Design Innovation							
	ID5.1: Incorporate a context-sensitive approach to design (e.g., stormwater capture)							NW (see entire section)
	ID5.2: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines							QL0.0, LD0.0,RA0.0, NW0.0, CR0.0

Note: This is an image of the Integrative Design Worksheet Excel based template for Design Teams working on **Infrastructure Projects**. Please reach out to the Support Section of Design Division for working document.

LA County Department of Public Works Sustainable Infrastructure Guidelines
Integrative Design Worksheet

	Strategy and Actions	R	Achieved			Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports Envision®
			Y	N	NA			
Site	**S1: Incorporate Smart Master Planning**							
	S1.1: Prepare a site assessment by incorporating site context and access opportunities	X						LD2.2, QL3.1
	S1.2: Protect existing natural resources and surface water	X						NW1.1, NW1.2, NW1.3, NW3.1
	S1.3: Contribute positively to community health and well-being (such as public gathering spaces,street furniture, parklets, signages, community gardens, exercise equipment, sidewalks, bike lanes etc.)							QL2.1, QL2.6, QL3.3
	S1.4: Enhance road safety							QL2.1, QL2.6
	S2: Maximize Site Access and Circulation							
	S2.1: Improve community connections, mobility, and access	X						LD1.3, LD2.2, QL2.4, QL2.5, QL2.6
	S2.2: Improve site accessibility, safety, and wayfinding	X						QL2.4, QL2.6, LD1.4
	S2.3: Optimize public environment for pedestrians							QL2.4, QL2.5
	S2.4: Provide EV charging stations and carpool priority parking where feasible							QL2.5
	S3: Incorporate Environmental Mitigation							
	S3.1: Mitigate heat island effect	X						CR2.5
	S3.2: Encourage ecological connectivity and habitat (if applicable)							NW1.4
	S3.3: Protect site and incorporate existing natural features where feasible							NW1.1, NW1.2, NW1.5, NW1.7
	S3.4: Avoid soil compaction and staging within tree driplines or restore disturbed soils (when feasible)							NW3.3
	S4: Incorporate Low Impact Development and Erosion Control							
	S4.1: Incorporate green infrastructure features and/or green streets							LD2.2, NW2.1, NW2.3
	S4.2: Prevent surface and groundwater contamination							NW2.3
	S4.3: Minimize erosion by mitigating the adverse effects of construction on steep slopes							NW1.6
	S5: Optimize Landscape Design							
	S5.1: Incorporate plant species biodiversity	X						NW3.1
	S5.2: Minimize all turf; utilize native vegetation and a low-water plant pallet	X						RA3.2, NW3.2
	S5.3: Control invasive plant species	X						NW3.2
	S5.4: Plant pest resistant species to avoid the need for pesticides							NW2.2
	S5.5: Use mulch or compost to increase water retention							RA3.2
	S6: Optimize Hardscape Design							
	S6.1: Maximize permeable surface where paving is required	X						NW2.1
	S6.2: Incorporate cool pavement/high albedo pavement							CR2.5
	S7: Optimize Smart Irrigation							
	S7.1: Conduct water metering if site is over 5,000 SF	X						RA3.3
	S7.2: Minimize outdoor water use (unless reclaimed water will be used for the project)	X						RA3.1, RA3.2
	S7.3: Use smart irrigation controller(s) and high-efficiency irrigation	X						RA3.1, RA3.2
	S8: Site Innovation							
	S8.1: Develop pilot or demonstration projects to stimulate sustainable growth and development with regard to sustainability site and landscape strategies to target one or more of the following: Environment improvement, Aesthetics, Community benefit, Public health improvement							QL1.2, QL2.1, QL3.2, QL3.3, QL0.0, NW0.0
	S8.2: Participate in conferences and other knowledge-sharing opportunities to stay abreast in the industry, share lessons learned, and share best practices							LD1.1, LD1.3
	S8.3: Work with local community to enhance bike and pedestrian network and/or bike share program							QL2.4
	S8.4: Incorporate green roofs							NW2.1, CR2.5

LA County Department of Public Works Sustainable Infrastructure Guidelines
Integrative Design Worksheet

	Strategy and Actions	R	Achieved Y	Achieved N	Achieved NA	Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports Envision®
Site	S8.5: Consider induction charging, solar roadways, and other emerging technologies							QL2.5
Site	S8.6: Restore existing plazas, parks, recreational areas, or wildlife refuges as part of a given project; consider using existing features where							QL3.3
Site	S8.7: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines							QL0.0, LD0.0,RA0.0, NW0.0,
Water	**W1: Improve Water Quality**							
Water	W1.1: For initial planning, review site design concepts and constraints specific to the LA region	X						LD3.2
Water	W1.2: Review the Stormwater BMP Design and Maintenance Manual and the County's Hydrology Manual for Publicly Maintained Storm Drain	X						LD3.2
Water	W1.3: Review and maximize LID design integration, where feasible	X						LD2.2, NW2.1
Water	W1.4: Consider drought-tolerant landscaping resources for native plants that reduce the need for fertilizer application; consider placement of non-invasive drought-tolerant plant and tree species that are appropriate for the climate zone of the project	X						NW2.2, NW3.1, NW3.2
Water	W1.5: Review design parameters for River and Channel Greenway Projects (LA County Flood Control District right-of-way) and consult with DPW Watershed Management Division staff for additional guidance/input	X						NW1.5
Water	W1.6: Capture and retain 100% of the Stormwater Quality Design Volume (SWQDv) on-site through LID methods, unless technically infeasible to do so; comply with the LID 2014 Section 3; consult with DPW's Land Development Division and Watershed Management Division for additional	X						NW2.1
Water	W1.7: Integrate treatment BMPs that target existing water quality impairments and applicable total maximum daily load pollutants; consult with DPW Watershed Management Division staff to identify requirements relating to the specific site based on compliance with the MS4 permit							NW2.1, NW2.2, NW2.3
Water	W1.8: Design facilities to minimize pollutant releases to sensitive environments, floodplains, and groundwater; consult with DPW Geotechnical and Materials Engineering Division for additional guidance/input regarding infiltration sites							NW2.3
Water	W1.9: Design to reduce soil disturbance and maximize on-site beneficial reuse; restore disturbed soils for percolation and plant growth potential during construction							NW1.1, NW3.3
Water	**W2: Restore Natural Hydrology**							
Water	W2.1: Incorporate dry or vegetated drainage pathways that integrate inline/offline stormwater retention/detention opportunities	X						NW1.4, NW3.3
Water	W2.2: Mitigate hydromodification and/or preserve/restore watercourse stability and natural streambed sediment transport	X						NW3.3, NW3.4
Water	W2.3: Conserve site's existing natural qualities for runoff management and treatment	X						NW2.1, NW3.4
Water	W2.4: Favor placement of detention/retention/infiltration facilities in upstream areas to capture runoff close to its source							NW2.1
Water	W2.5: Maximize permeable surface area							NW3.4
Water	W2.6: Reduce design slope on embankments, and promote creation of flat areas for improved infiltration and meandering of surface runoff							NW1.6
Water	**W3: Reduce Flooding**							
Water	W3.1: Protect, maintain, and create absorbent landscapes; maximize use of pervious paving where paving is needed (min 25% pervious pavement)	X						NW2.1, NW3.4
Water	W3.2: Develop opportunities for floodplain optimization and increasing its function via pipe daylighting, existing bank widening, offline systems, dry ponds, etc.	X						NW1.5
Water	W3.3: Meet or exceed on-site storage capacity requirements	X						NW2.1

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Water	**W4: Optimize Stormwater Reuse**							
	W4.1: Review opportunities to feasibly harvest stormwater for storage and reuse	X						RA3.2, NW2.1
	W4.2: Maximize opportunities for stormwater harvesting and reuse of stormwater to meet project's non-potable needs, where applicable	X						RA3.2
	W4.3: Incorporate real-time controls into large-scale stormwater capture/reuse systems for optimizing flood control and groundwater recharge							NW0.0, LD3.2, RA3.2, NW2.1
	W5: Reduce Potable Water Consumption							
	W5.1: Reduce overall potable water consumption needs to meet/exceed current county/state goals (such as specify low-flow/high-efficiency fixtures and irrigation systems)	X						RA3.2
	W5.2: Locate water supply meters at strategic points to monitor usage, improve efficiencies, detect leaks, and support future tracking and reporting of water consumption	X						RA3.3
	W5.3: Increase public benefit and education of water conservation through implementation of wastewater and stormwater capture/reuse demonstration projects							QL1.1, NW2.1
	W6: Water Innovation							
	W6.1: Incorporate whole systems balance planning for water							RA3.2,
	W6.2: Participate in conferences and other knowledge-sharing opportunities to stay abreast in the industry, share lessons learned, and share best practices							QL0.0, LD0.0, RA0.0, NW0.0,
	W6.3: Develop pilot or demonstration project or adjust scope of typical DPW projects to include stormwater treatment technologies to target one or more of the following: Environmental improvement, aesthetic and community benefit, and public health improvement							QL0.0, LD0.0, RA0.0, NW0.0, CR0.0
	W6.4: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines							QL0.0, LD0.0, RA0.0, NW0.0,
	E1: Minimize Light Pollution							
	E1.1: Design lighting to reduce light spillage effects and glare through the application of cutoff lenses that direct lighting to where it is needed	X						QL2.3
	E1.2: Evaluate lamp brightness based on background illumination condition; replace existing lamps to improve light quality	X						QL2.3
	E2: Reduce Energy Consumption							
	E2.1: Take a whole-systems design approach to energy systems	X						RA2.1
	E2.2: Incorporate high-efficiency lighting and lighting controls (while still maintaining safety with regard to lighting)	X						RA2.1
	E2.3: Use energy-efficient and/or low carbon or alternative fuel equipment where feasible (e.g., pumps)	X						RA2.1
	E2.4: Add motion sensors to equipment/ fixtures	X						RA2.1
	E2.5: Incorporate dynamic lighting (remote sensing in large areas, not for public roadway applications)							RA2.1
	E3: Incorporate Energy Sub-Metering							
	E3.1: Incorporate energy sub-metering to support future tracking and reporting of energy consumption	X						RA2.3
	E4: Commission Energy Systems							
	E4.1: Incorporate energy commissioning							RA2.3
	E4.2: For design-build projects, develop and review detailed commissioning implementation plan based on design-build entity's final							RA2.3

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	Strategy and Actions	R	Achieved Y	Achieved N	Achieved NA	Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports Envision®
Energy	**E5: Incorporate Renewable/Alternative Energy**							
	E5.1: Incorporate renewable or alternative energy (including but not limited to wind, geothermal, waste to energy)							RA2.2
	E5.2: Use solar panels on roof/parking structures							RA2.2
	E5.3: Conduct assessment of cost-effective photovoltaic (PV) system							RA2.2
	E6: Optimize Traffic Signals Systems							
	E6.1: Incorporate LED technology in all new traffic signals	X						RA2.1
	E6.2: Incorporate time-based coordination, traffic responsive or adaptive traffic control systems	X						RA0.0
	E6.3: Use fiber optic or wireless communication systems to remotely communicate to traffic control and use monitoring devices for better traffic management							RA0.0
	E7: Optimize Street Lighting							
	E7.1: Use LED technology for street and pedestrian lighting	X						RA2.1
	E7.2: Encourage Lighting Management Districts to switch to LEDs							RA2.1
	E7.3: Use a reduced foot candle requirement/re-lamp/re-ballast interior light with instant start ballast							RA2.1
	E8: Energy Innovation							
	E8.1: Consider solar roadway technology for roads, crosswalks, sidewalks, parking lots, and bike paths in areas of the County with snowfall to assist with reduced maintenance and safety							RA0.0
	E8.2: Develop pilot or demonstration project with regard to energy reduction and renewable/alternative energy technologies							RA0.0
	E8.3: Consider Energy Savings Performance Contracting partners/projects to implement renewable/alternative energy projects							RA0.0, RA2.2
	E8.4: Use Demand Response programs (temporary measures to implement for high temperature events)							RA0.0
	E8.5: Partner with local universities to explore the latest energy							RA0.0
	E8.6: Consider energy storage technologies such as batteries for use during night time							RA0.0
	E8.7: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines							QL0.0, LD0.0, RA0.0, NW0.0,
Materials	**M1: Use Durable Materials**							
	M1.1: Maximize recycled, durable, and reclaimed materials	X						RA1.3, RA1.7, LD3.3
	M1.2: Use rubberized asphalt concrete that lasts 50% longer than conventional asphalt concrete or equivalent with regards to durability							LD3.3
	M2: Reduce Air Pollutants							
	M2.1: Specify materials with low toxicity, minimal process emissions, low-VOC, recycled content, resource efficiency, recycled materials, reusable components, sustainable or locally sourced, moisture resistant, etc.	X						CR1.2, RA1.2, RA1.3, RA1.4, LD2.1
	M2.2: Comply with South Coast Air Quality Management District (SCAQMD) rules for Source Specific Standards and Toxics and Other Non-Criteria Pollutants	X						CR1.2
	M3: Enhance Pavement Lifecycle							
	M3.1: Use pavement life-cycle cost analysis at a preliminary engineering level when pavement material is needed							LD3.3
	M3.2: Use warm mix asphalt when applicable							LD3.3
	M4: Reuse Materials on Project Site							
	M4.1: Use Cold in Place Recycling (CIPR) and Cold Central Plant Recycling (CCPR) to reuse pavement materials in place							RA1.3
	M4.2: Stabilize and strengthen the existing base/subgrade materials in place by adding cement or lime to form Cement Stabilized Pulverized Base (CSPB) or Lime Stabilized Pulverized Base							LD3.3

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	Strategy and Actions	R	Achieved Y	Achieved N	Achieved NA	Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports Envision®
Materials	**M5: Provide for Deconstruction and Recycling**							
	M5.1: Establish waste diversion goals for the project by identifying at least three materials targeted for diversion	X						RA1.5
	M5.2: Recycle and/or salvage nonhazardous construction and demolition materials, if applicable	X						RA1.5, RA1.7
	M5.3: Use crushed miscellaneous base (CMB) whenever possible							RA1.3, RA1.6
	M5.4: For projects requiring substantial amounts of fill material, consult with Water Resources Division (WRD) and Flood Maintenance Division (FMD) for nearby sources of fill material							RA1.4
	M6: Materials Innovation							
	M6.1: Use software to balance earthwork (assists a project through digitization of all documents that take volume measurements with ease using PDF drawings)							RA1.4
	M6.2: Use non-destructive testing methods, such as Falling Weight Deflectometer and Ground Penetrating Radar to evaluate existing flexible and rigid pavement structure; include foamed asphalt and Engineered Emulsion Stabilized Pulverized Base (EESPB)							RA0.0
	M6.3: Reduce the net embodied energy of project materials over the project life							RA1.1
	M6.4: Partner with local universities to explore and pilot new and innovative materials (self-healing concrete, biochar, water filtration							RA0.0
	M6.5: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines							QL0.0, LD0.0, RA0.0, NW0.0,
Climate Mitigation and Resilience	**CR1: Identify GHG Emissions Reductions**							
	CR1.1: Identify which SIG strategies have been implemented that contribute to GHG reductions and categorize them into one of the following: Transportation, Energy, Materials/waste, Water *A worksheet was developed to help project teams implement this action (see Appendix C)*	X						CR1.1
	CR1.2: Quantify the reduction of GHG emissions for the project *A worksheet was developed to help project teams implement this action (see Appendix C)*							CR1.1
	CR2: Identify Climate Vulnerabilities							
	CR2.1: Collect climate science data relevant to the project site for the following impacts (as appropriate): Heat events, Intense rainstorms and flooding, Wildfires, Extreme high-tide and storm surges related to sea level rise	X						CR2.1, CR2.2
	CR2.2: Determine the potential physical and/or operational impacts based on climate science data for 2030, 2050, and 2100							CR2.1, CR2.3
	CR2.3: Complete climate vulnerability assessment of the project that addresses exposure, sensitivities, and adaptive capacity							CR2.2
	CR2.4: Conduct outreach to emergency management officials to discuss project and potential climate change impacts							CR2.1
	CR3: Design for a Changing Climate							
	CR3.1: If project is vulnerable to climate impacts, develop, for consideration, a list of potential adaptation strategies (temporary and	X						CR2.3, CR2.4
	CR3.2: If project site is vulnerable to climate change impacts within its estimated lifespan, implement appropriate adaptation strategy to reduce or remove its vulnerability							CR2.3, CR2.4
	CR4: Climate Mitigation and Resilience Innovation							
	CR4.1: Implement an innovative pilot/demonstration project that addresses climate mitigation and/or resilience							CR0.0
	CR4.2: Include consideration for climate change impacts on human health and well-being							QL2.1
	CR4.3: Include consideration and mitigation of social and economic vulnerabilities							CR2.2
	CR4.4: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines							QL0.0, LD0.0, RA0.0, NW0.0,

LA County Department of Public Works Sustainable Infrastructure Guidelines
Integrative Design Worksheet

	Strategy and Actions	R	Achieved Y	Achieved N	Achieved NA	Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports Envision®
Construction	**C1: Minimize Pollution from Construction Activity**							
	C1.1: Incentivize the contractor selection process based on emissions/energy use thresholds of construction equipment and process in							RA1.2
	C1.2: Establish training program for project management/construction management (PMCM)							
	C2: Manage Waste and Recycling							
	C2.1: Divert waste from landfills; document the quantifiable waste and destination of waste exported from site	X						RA1.5
	C2.2: Reduce excavated materials taken off-site; when appropriate, allow on-site material to be reused as backfill or embankment							RA1.5
	C2.3: Minimize sediment trash and construction debris from leaving site							
	C3: Minimize Trucking							
	C3.1: Streamline efficient use of truck trips during construction	X						CR1.1
	C3.2: Establish sufficient site areas available for contractor stockpiles and storage to minimize extent of trucking required							
	C4: Protect Existing Natural Systems							
	C4.1: Control water usage for dust, and incorporate alternative methods for dust mitigation and compaction	X						RA3.2
	C4.2: Avoid staging materials under trees or on sensitive soil to minimize project impacts on the natural environment during construction							
	C5: Reduce Noise and Vibration							
	C5.1: Use the least disruptive of technologies available (while being cost effective) for maintenance or replacement, repair or rehabilitation of existing stormwater, sanitary sewer, or combined storm/sewer lines	X						QL2.2
	C5.2: Clearly identify hours of work restrictions in Request for Proposal and enforce requirements on project site (if applicable and not already included in construction specifications)							
	C6: Reduce Air Pollutants							
	C6.1: Comply with California Ambient Air Quality Standards (CAAQS)	X						CR1.2
	C6.2: Specify Alternative fuel construction equipment							CR1.2
	C7: Incorporate Climate and Risk into Construction Plans							
	C7.1: Require submittal of construction contingency plans in case of natural disasters (e.g., rain, earthquake, fire) or if work itself poses significant risk (e.g., dam modifications, major hillside stabilizations)							CR2.2
	C8: Minimize Resource Consumption during Construction							
	C8.1: Determine water needs based on construction processes/activities and identify alternatives to potable water use (such as recycled water for dust control and concrete production)							
	C8.2: Specify ENERGY STAR equipment							
	C8.3: Install daylight/occupancy sensor controls in field offices							
	C8.4: Work with suppliers that collect unused materials/packaging or have take-back programs							
	C9: Construction Innovation							
	C9.1: Integrate sustainable construction practices as part of contractor best value selection							
	C9.2: Gain industry input by requesting alternative submittals for more energy efficient/sustainable materials and processes as part of contract process, and take advantage of positive industry input							CR1.1, RA1.2
	C9.3: Work with trade organizations such as the Business Industry Association (BIA) to understand the latest BMPs in construction techniques							
	C9.4: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines							QL0.0, LD0.0, RA0.0, NW0.0, CR0.0

LA County Department of Public Works Sustainable Infrastructure Guidelines
Integrative Design Worksheet

	Strategy and Actions	R	Achieved Y	Achieved N	Achieved NA	Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports Envision®
Operations and Maintenance	**OM1: Plan for Long-Term Monitoring and Maintenance**							
	OM1.1: Develop Maintenance Plan/Manual (including for bioretention/ biosw ales, if relevant)	X						LD3.1, LD3.3
	OM1.2: Identify entities responsible for long-term maintenance; determine roles and responsibilities of entities for the long-term operations and maintenance of the w ork and its related equipment	X						LD3.1, LD3.3
	OM1.3: Develop an ongoing inspection schedule including performance monitoring prior to end of w arranty period	X						LD3.1, LD3.3
	OM1.4: Require initial training for care of systems and unique materials from the contractor, including video of training sessions							QL1.3
	OM1.5: Develop a "lessons learned" forum and update the maintenance plan and/or training to address issues to maintain asset longevity and optimize performance							
	OM2: Promote Preventative Maintenance							
	OM2.1: Utilize pavement condition index (PCI) score for different projects (e.g., roads) to prioritize maintenance or utilize pavement management softw are to prioritize pavement maintenance	X						LD3.1, LD3.3
	OM2.2: Establish integrated database of asset management, including inspections, maintenance and repair schedules and responsibilities (budget/labor/contracting), and develop a comprehensive program for upkeep of County assets. Maintain asset tracking system reflecting current conditions and related upkeep activities							
	OM2.3: Establish a "useful life" for routine repair and refurbishment of County assets and overlay these requirements into integrated database and county budgeting process							
	OM2.4: Establish uniform training for County's life-cycle inspection and maintenance of typical asset classes							
	OM3: Establish Asset Class Performance and Maintenance							
	OM3.1: Incorporate performance measures into operations and maintenance procedures	X						LD3.1, LD3.3
	OM3.2: Develop threshold maintenance condition indexes to evaluate asset class conditions such as using the PCI example							
	OM4: Establish Funding							
	OM4.1: Identify or establish funding mechanisms and allocations for ongoing operations and maintenance	X						LD3.1
	OM4.2: Change asset budget and management process to provide adequate funding for regular interval maintenance and repairs							LD3.1
	OM5: Reduce Pesticides and Fertilizers							
	OM5.1: Implement an integrated pest management plan that supports policies affecting fertilizer and pesticide use w ithin the County							NW2.2
	OM6: Reduce Air Pollutants							
	OM6.1: Comply w ith CAAQS	X						CR1.2
	OM6.2: Comply w ith SCAQMD rules for Source Specific Standards and Toxics and Other Non-Criteria Pollutants							CR1.2
	OM6.3: Purchase alternative fuel maintenance vehicles and equipment							CR1.1, CR1.2
	OM7: Operations and Maintenance Innovation							
	OM7.1: Incorporate exemplary or sustainable best practices not specifically addressed by the guidelines							LD 3.3, RA2.3

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Appendix B: Integrative Design Worksheet for Small Buildings (<10,000 SF)

Introduction

This integrative design worksheet has been developed as an in-house tool for DPW staff to evaluate sustainability strategies for small building projects (between 1,000 to 10,000 SF).

As part of the DPW SIG, DPW small building projects are required to:

1. Achieve CALGreen mandatory measures (additional detail provided in the County's Green Buildings Standard Code Plan Review List: http://dpw.lacounty.gov/bsd/content/publications.aspx)
2. Evaluate recommended CALGreen Tier 1 measures and implement if feasible
3. Evaluate recommended DPW-specific actions and implement if feasible
4. Consider innovative strategies that go beyond business as usual

It is recommended that the design team, with stakeholders, complete this worksheet at the start of a project. This worksheet shall then be reviewed/updated, as necessary, throughout the life of the project. An explanation shall be provided for all mandatory measures/actions, which are applicable, that cannot be achieved.

This worksheet is set up as follows:

- Basic Project Information
- Sustainability Discussion Topics
  - Planning and Design Considerations
  - Energy Considerations
  - Water Considerations
  - Materials Considerations
  - Environmental Quality Considerations

Once completed, this worksheet is to be included with the project files as supplemental information.

LA County Department of Public Works Sustainable Small Building Guidelines
Integrative Design Worksheet

Project Name:		**Date:**
Project ID:		
Project Manager:		
Design phase submission:	☐ Concept ☐ 60% ☐ 90% ☐ 100% ☐ Other :	
Completed by (include email):		**Email:**
Specific Energy/ Water/ Renewable targets:		
Site Conditions/ Massing/ Orientation:		
Transportation:		
Basic Envelope Attributes:		
Lighting Levels:		
Thermal Comfort Ranges:		
Plug and Process Load needs:		
Programmatic & Operational Parameters:		
Water demand (indoor and outdoor):		
Process water demand:		

☐ Exempt ☐ Unable to comply

If any of the above selected, provide supporting narrative here

	Strategy					Achieved						
	CALGreen Mandatory	CALGreen Targeted	DPW-specific	Innovation	Measure / Action *(CALGreen reference section in parenthesis)*	Reqd	Y	N	NA	Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports LEEDv4
Planning and Design	X				**SB1.1:** (5.106.1) Storm water pollution prevention	X						SSp1
	X				**SB1.1:** (5.106.3) Low Impact Development (LID)	X						SSc4
	X				**SB1.1:** (5.106.10) Grading and Paving	X						
	X				**SB1.1:** (5.304) Outdoor water use	X						WEp1 WEc1
	X				**SB1.1:** (5.160.4) Bicycle parking- short term, long term	X						LTc6
	X				**SB1.1:** (5.106.5.2) Designated parking for clean air vehicles	X						LTc7
	X				**SB1.1:** (5.106.5.3) Electric Vehicle (EV) Charging for future installation	X						LTc8
	X				**SB1.1:** (5.106.8) Light pollution reduction	X						SSc6
		X			**SB2.1:** (A5.106.11) Heat island effect- Hardscape alternatives and cool roof	X						SSc5
		X			**SB2.2:** (5.106.5.2) Designated parking for clean air vehicles *(Approx. 10% of total spaces)*							SSc4
		X			**SB2.3:** (5.106.5.3) Electric Vehicle (EV) charging for future installation of electric vehicle supply equipment (EVSE) *(Approx 8% of total spaces)*							
			X		**SB3.1:** Use Integrative Design Worksheet (IDW) to implement sustainability strategies *(Hold a sustainability kick-off meeting at the start of the project and included sustainability in each meeting*	X						IPc1
			X		**SB3.2:** Incorporate Sustainability Educational Signage	X						
			X		**SB3.3:** Evaluate Funding Opportunities *(grant/incentive programs that would support sustainability strategies)*							
			X		**SB3.4:** Open ENERGY STAR Portfolio Manager Profile to track energy and water use consumption (where feasible)							
				X	**SB4.1**: Incorporate sustainable design strategies in prefab or modular buildings							
				X	**SB4.2**: Complete LEED: Building Operations and Maintenance (O+M) checklist and consider pursuing certification							
				X	**SB4.3**: Achieve exemplary performance levels for any actions identified in planning and design (SB2 and SB3)							

Note: This is an image of the Integrative Design Worksheet Excel based template for Design Teams working on **Small Building Projects**. Please reach out to the Support Section of Design Division for working document.

LA County Department of Public Works Sustainable Small Building Guidelines
Integrative Design Worksheet

	Strategy					Achieved				Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports LEEDv4
	CALGreen Mandatory	CALGreen Targeted	DPW-specific	Innovation	Measure / Action *(CALGreen reference section in parenthesis)*	Reqd	Y	N	NA			
Energy	X				**SB1.1:** (5.201.1) Comply with 2016 Building Energy Efficiency Standards - Title 24, Part 6	X						EAp2 EAc2
		X			**SB2.4:** (A5.203.1.1.1) Outdoor Lighting *(Min 10% outdoor lighting energy saving)*	X						EAp2 EAc2
		X			**SB2.5:** (A5.211.1) On-site renewable energy and documentation (*PV amount = 1% of gas/propane + 1% electrical energy use)*							EAc5
		X			**SB2.6:** (A5.203.1.2) Energy savings over baseline *(5% for projects including lighting or mechanical systems and 10% for projects including lighting and mechanical systems)*							EAp2 EAc2
			X		**SB3.5:** Evaluate and Incorporate Energy Efficiency Measures Identified in the ECM Matrix	X						EAc2
			X		**SB3.6:** Specify ENERGY STAR Appliances and lights wherever applicable *(LED light fixtures for specific ldg. types- office, residence)*							EAc2
				X	**SB4.4**: Evaluate the energy efficiency measures identified in the ECM matrix as 'Innovative / Other Strategies'							EAc2
				X	**SB4.5**: Conduct a feasibility analysis for Net Zero Energy and/or solar battery storage							
				X	**SB4.6**: Achieve exemplary performance levels for any actions identified in Energy (SB2 and SB3)							

Energy Conservation Measures (ECM) Matrix

	Optimize Solar orientation	Window to wall ratio	Shading	Low flow fixtures	Maximize daylight	Natural ventilation	Mixed mode ventilation	Interior Lighting-LED	Lighting controls	Task lighting	Exterior lighting- LED	Gravity driven fans	Economizers	High performance Glazing	Demand control Ventilation	Envelope insulation	Hot water heater efficiency	Solar thermal (residential)	Higher equipment efficiency	Equipment controls (BMS)	System type selection	Photovoltaics
Office	x	x	x	x	x	x^1		x^3	x^3	x^3	x		x	x	x	x^2	x		x	x	x	x^3
Warehouse	x	x	x		x	x	x	x^3	x		x	x	x		x	x			x	x		x^3
Workshop/ Maintenance	x	x	x	x	x	x^1		x^3	x^3		x		x		x	x^2			x	x		x^3
Storage	x	x	x			x^1	x	x^3	x^1		x		x			x			x	x		x^3
Residence	x	x	x^1	x	x	x^3	x	x^3	x		x					x^2	x	x				x^3

x^1 Measures recommended based on ROI in CZ9

x^2 Measures recommended based on ROI in CZ16

x^3 Measures recommended based on ROI in CZ9 & CZ16

Innovative strategies

Passive solar heating using high mass floor
Heat Recovery (in conjunction w/ economizers)
Earth tube system
Anidolic Lighting System
Individual Control for HVAC system (for at least 50% of building occupants)
Personal comfort system
User-centered Thermal Control using mobile technology
Bio-sensing Adaptive Environmental Control
Solar Activated Façade (SAF)
Building Integrated Photovoltaics

LA County Department of Public Works Sustainable Small Building Guidelines
Integrative Design Worksheet

	Strategy					Achieved				Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports LEEDv4
	CALGreen Mandatory	CALGreen Targeted	DPW-specific	Innovation	Measure / Action *(CALGreen reference section in parenthesis)*	Reqd	Y	N	NA			
Water	X				**SB1.1:** (5.303) Obtain approval from mechanical section for compliance with Indoor Water Use requirements	X						WEp2 WEc2
	X				**SB1.1:** (5.304) Obtain approval from Land Development Division for water budget for landscaping area greater than 500 sf. *Must comply with local landscape ordinance or MWELO, whichever is more stringent*	X						WEp1 WEc1
		X			**SB2.7:** (A5.303.2.31) Indoor potable water use reduction *(12% reduction by either prescriptive or performance method)*							WEp2 WEc2
		X			**SB2.8**: (Division 5.3) Comply with one elective measure selected from Division 5.3: Water Efficiency and Conservation							
			X		**SB3.7:** Water Efficient Landscaping *(Reduce potable water use by 30% through plant selection and system)*	X						WEp1
			X		**SB3.8:** Incorporate High Efficiency Irrigation and Weather Forecasting	X						WEc1
				X	**SB4.7:** Conduct a feasibility analysis for Net Zero Water							
				X	**SB4.8:** Achieve exemplary performance levels for any actions identified in Water (SB2 and SB3)							
Materials	X				**SB1.1:** (5.407.2.2.1) Design exterior entries and openings to prevent water intrusion into the building	X						
	X				**SB1.1:** (5.408.1) Obtain approval from Environmental Programs Division for a Recycling and Reuse Plan (RRP) *Min 65% waste diversion*	X						MRp2 MRc5
	X				**SB1.1:** (5.410.1) Recycling by occupants *Comply with the Waste and Recycling Storage Area Requirements Plan Correction List.*	X						MRp1
	X				**SB1.1:** (5.410.4) Testing and adjusting of systems *Provide O&M Manual, complete Form 5.410- Testing and Adjusting*	X						EAp1 EAc1
		X			**SB2.9:** (A5.405.1) Regional materials (*Sourcing within 500 miles of project site, 10% of total material cost)*	X						MRc3
		X			**SB2.10:** (A5.405.2.1) Bio-based materials- Certified wood products (*50% bio based content)*	X						MRc3
		X			**SB2.11:** (A5.405.4) Recycled content - Tier 1 *(10% of total material cost of project)*	X						MRc3
		X			**SB2.12:** (A5.405.5.2.1) Supplementary cementitious materials (SCMs) *Examples: fly ash, slag cement, silica fume in concrete*	X						MRc4
		X			**SB2.13:** (A5.406.1.1) Service life *(References material)*	X						MRc1
		X			**SB2.14:** (5.407.2.2.2) Flashing *(integrate with drainage plan)*	X						
		X			**SB2.15:** (A5.408.3.1.1) Enhanced construction waste reduction–Tier 1 (*Min 65% diversion)*	X						MRp2 MRc5
			X		**SB3.9:** Material Ingredient Disclosures *(Give preference to materials with environmental product declarations (EPD's) and health product declarations (HPD's).)*							MRc2
			X		**SB3.10:** Complete building material LCA study using publicly available software *(such as ATHENA, BEES, etc.)*							MRc1
				X	**SB4.9**: Conduct a feasibility analysis for Net Zero Waste							
				X	**SB4.10**: Achieve exemplary performance levels for any actions identified in Materials (SB2 and SB3)							

LA County Department of Public Works Sustainable Small Building Guidelines
Integrative Design Worksheet

	Strategy					Achieved				Compliance Documentation *(Narrative, calculation, or reference to dwg, spec, plan)*	Responsible *(Name)*	Supports LEEDv4
	CALGreen Mandatory	CALGreen Targeted	DPW-specific	Innovation	Measure / Action *(CALGreen reference section in parenthesis)*	Reqd	Y	N	NA			
Evnironmental Quality	X				**SB1.1:** (5.503.1) Fireplaces *Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace or a sealed woodstove*	X						
	X				**SB1.1:** (5.504.3) Covering of duct openings and protection of mechanical equipment during construction	X						EQc3
	X				**SB1.1:** (5.504.4) Meet or exceed standards for adhesives, sealants, caulks, paints and coatings and carpet systems. *Meet all relevant sections 5.504.4.1, 5.504.4.3, 5.504.4.4*	X						EQc2
	X				**SB1.1:** (5.504.4.5) Composite w ood products	X						EQc2
	X				**SB1.1:** (5.504.4.6) Resilient flooring *Min 80% of floor*	X						EQc2
	X				**SB1.1:** (5.504.7) Environmental tobacco smoke (ETS) control. *No smoking area within 25' of building entries, outdoor air intakes, operable windows, and in buildings*	X						EQp2
	X				**SB1.1:** (5.507.4.3) Interior sound transmission. *Min STC =40 (for interior walls, floors, ceilings)*	X						EQc9
	X				**SB1.1:** (5.507.4.1) Exterior noise transmission *Min STC= 50 (for walls, roof)* *Min STC= 40 (for exterior windows)*	X						EQc9
		X			**SB2.16:** (A5.504.4.7.1) Resilient flooring systems, Tier 1 and verification of compliance (90% of floor)	X						EQc2
		X			**SB2.17:** (A5.504.4.8) Thermal insulation, Tier 1 *(Low VOC)*	X						
		X			**SB2.18:** (A5.504.4.9) Acoustical ceilings and w all panels and verification of compliance *(Low VOC)*	X						EQc9
		X			**SB2.19:** (A5.504.5.3.1) Filters, Tier 1 *(Minimum Efficiency Reporting value -MERV 11)*	X						EQc1
		X			**SB2.20:** (A5.507.1.1.1) Lighting (*Individual task lighting for 90% of occupants)*	X						EQc6
		X			**SB2.21:** (A5.507.1.2) Multi-occupant spaces *(Lighting & thermal comfort controls for all shared spaces)*	X						EQc5 EQc6
		X			**SB2.22:** (A5.508.1.3) Hydrochlorofluorocarbons (*Avoid HCFCs)*	X						EAp3 EAc4
				X	**SB4.11**: Evaluate potential climate change stressors, impacts, and resilience							
				X	**SB4.12**: Achieve exemplary performance levels for any actions identified in Environmental Quality (SB2 and SB3)							

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Appendix C: SIG Greenhouse Gas Emissions Reduction Worksheet

Instructions

This Greenhouse Gas Emissions Reduction Worksheet has been developed as an in-house tool for DPW to complete SIG strategy CR1: Identify GHG Emissions Reductions (CR1.1 and CR 1.2). The SIG strategies that reduce GHG emissions in transportation, energy, and materials/waste, have already been identified in this worksheet.

1. **Highlight project strategies that reduce GHG (CR1.1):**
    a. Complete column 'Achieved (Y/N)' to highlight which relevant SIG strategies reduce GHG.
2. **Determine project GHG reductions (CR2.1):**
    a. Has project completed a GHG calculation (often included in NEPA/CEQA process, or part of an Environmental Review/Assessment)? If yes, utilize this data and do not complete worksheet. If not, follow option 1 or option 2.
    b. Option 1: For each strategy that achieved a 'Y' in step one, reference the recommended GHG calculation methodologies (web links with guidance at bottom) to calculate baseline and design case.
    c. Option 2: If some GHG calculations have already been completed, utilize the data and enter in the 'Option 2' column.

DPW SIG Strategy		Achieved (Y/N)	GHG Reduction Methodology	MTCO2e Reduction Option 1			MTCO2e Reduction Option 2
				Base Case	Design Case	Reduction (Base - Design)	GHG Reduction
Transportation:							
ID3	Incorporate Complete Streets		CAPCOA Chapter 7 Section 3.2.1, 3.2.2, 3.2.5, 7.0				
S1	Incorporate Smart Master Planning		CAPCOA Chapter 7 Section 3.0				
S2	Maximize Site Access and Circulation		CAPCOA Chapter 7 Section 3.1.2				
C3	Minimize Trucking		CAPCOA Chapter 7 Section 8.0				
Energy:							
S1	Incorporate Smart Master Planning		CAPCOA Chapter 7 Section 2.1				
W4	Optimize Stormwater Reuse		CAPCOA Chapter 7 Section 4.1				
W5	Reduce Potable Water Consumption		CAPCOA Chapter 7 Section 4.2				
E2	Reduce Energy Consumption		CAPCOA Chapter 7 Section 2.1				
E5	Incorporate Renewable / Alternative Energy		CAPCOA Chapter 7 Section 2.3.2 - 2.3.3				
E6	Optimize Traffic Signals Systems		CAPCOA Chapter 7 Section 2.2				
E7	Optimize Street Lighting		CAPCOA Chapter 7 Section 2.2				
Materials and Waste:							
M1	Use Durable Materials		Use EPA WARM Model to determine GHG reduction from source reduction of material that will not need replacing over standard timeline				
M3	Enhance Pavement Life-Cycle						
M4	Reuse Materials on Project Site						
M5	Provide for Deconstruction and Recycling		CAPCOA Chapter 7 Section 6.0				
C2	Manage Waste and Recycling		CAPCOA Chapter 7 Section 6.0				

Links to recommended GHEG Calculation Tools:
https://www.fhwa.dot.gov/environment/climate_change/mitigation/tools/carbon_estimator/index.cfm
http://www.caleemod.com/
EPA WARM Tool

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Appendix D: Case Studies

Integrative Design (ID) Case Studies

Metro Eastside Access Phase 2

Location: East Los Angeles, CA
Timeframe: 2012 – 2016

Metro and the project consultant team provided creative and sustainable improvements within the public right-of-way to better connect the Metro Gold Line Eastside light rail stations with the surrounding community in unincorporated East Los Angeles.

Improvements planned and designed include:

- Improved bikeways
- Safety and walkability components (e.g., enhanced crosswalks, bump-outs, LED)
- Plantings and infiltration devices
- Wayfinding and identity elements (e.g., signage, identity monuments)

To achieve these improvements, Metro and the team integrated information from:

- Outreach, event planning, and bicycle planning consultants
- Previous and concurrent studies (e.g., bicycle master plans, relevant specific plans)

The community's vibrant history and culture inspired the design of improvements in each station area, which will allow Metro to achieve a high Envision score.

I-710 Corridor Improvements

Location: Los Angeles, CA
Timeframe: 2007 – 2017

On behalf of Metro, AECOM is conducting a study of the utility impacts of proposed improvements to I-710 and further developing the structural plan for the elevated truck corridor from I-405 to Ocean Boulevard.

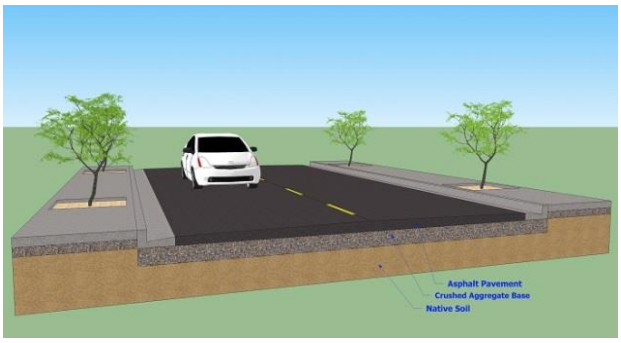
In addition, Metro, Caltrans, and five other partners are conducting an environmental impact study to analyze possible improvement alternatives for I-710, between the ports of Long Beach and Los Angeles and SR-60.

To facilitate an integrated process, the team:

- Generated a 3D model and graphic database of existing utilities
- Identified potential impacts from the elevated freight corridor structures on existing utilities
- Avoided significant impacts to existing features through geometric alternatives
- Minimized impacts on the Los Angeles River levee during construction by coordinating early with the county Flood Control District

LA County DPW Sustainable Pavement Practice

Location: Throughout County, CA
Timeframe: Ongoing



The County DPW maintains the roadways in the County in the most cost-effective, soundly engineered, and environmentally friendly manner. This is achieved through sustainable treatments that:

- Take care of our roads that are in good condition, first
- Use recycled materials in treatment selections
- Reutilize existing materials in place

To determine program success, DPW looks at energy usage and GHG emissions net savings, and compares each sustainable treatment used to the equivalent hot mix alternative.

There are many types of pavement treatment options that apply to roads, and DPW takes pride in ensuring that sustainable treatments are used whenever possible.

http://dpw.lacounty.gov/gmed/lacroads/Treatment.aspx

Site (S) Case Studies

El Parque Nuestro

Location: Florence-Firestone, Los Angeles County, CA
Timeframe: June 2010

In a heavily populated area of Florence-Firestone where park space is limited, El Parque Nuestro was initiated by a gift of land from a developer and named by a local child through a school contest. DPW secured a grant and worked with the County Department of Parks and Recreation and the community to develop the design.

The park has a playground, exercise par-course, jogging/walking trail, bicycle parking, picnic tables, grills, and an open turf area, and showcases many sustainable design elements:

- Pervious concrete
- Bioswales
- Solar lighting
- Recycled rubber play surfacing
- Site furnishings with recycled materials
- Weather-based irrigation controller
- Interpretive signs for public education

The site was successfully transformed from a former railroad spur to a welcoming, engaging space for all ages to enjoy.

Parklets – An Accessible Space for Everyone to Enjoy!

Location: East Los Angeles, CA
Timeframe: 2014

In East Los Angeles, underused space was transformed into publicly accessible open space, enhancing the quality of life in the community.

Benefits of Parklets include:

- Repurposing underused street spaces
- Enhancing function and aesthetic of the streetscape
- Increasing open space

Communities and business owners/district sponsors can apply to transform underused areas of one of the County's largest public asset, our streets, into active, vibrant, and accessible public space with Parklets.

Gale Avenue Landscape Improvements

Location: Hacienda, Los Angeles County, CA
Timeframe: October 2010

The community requested that existing asphalt service islands be transformed into vegetative screening between vehicular traffic on Gale Avenue and adjacent homes.

A combination of screening, curb cuts, ramps, and pervious concrete sidewalks:

- Allow runoff to enter the service island, infiltrate into the soil, and if necessary, overflow onto the lower adjacent road
- Provide pedestrian access and reduce vehicular conflicts

In addition, the existing bus stop was renovated to include seating and the community logo was embedded in the new decorative concrete surface.

Oxford Basin

Location: Marina Del Rey, CA
Timeframe: Spring 2016

Nestled between Admiralty Way and Washington Boulevard in Marina del Rey, Oxford Basin is a 10-acre flood control facility built in 1959 to provide flood protection to neighboring communities.

This facility, plagued in recent years by polluted sediment and degraded water quality, has been reimagined to include:

- Increased flood protection
- Cleaner water
- Park-like amenities
- Vibrant, native plant habitat (non-native and diseased vegetation replaced with 730 native trees and over 45,000 native plants)
- An illuminated walking path
- Bike lanes
- Decorative fencing

The County re-envisioned the 56-year-old basin to be a regional destination for public recreation and observing nature, while reducing flood risk, improving water quality, and establishing high-quality habitat.

Water (W) Case Studies

Elmer Avenue Neighborhood Retrofit

Location: Los Angeles, CA
Timeframe: 2010

In the Elmer Avenue Neighborhood that lacked a storm drain system and was prone to flooding, a sustainable alternative was designed by the Council for Watershed Health, partners, and residents.

To reduce, capture, treat, and infiltrate runoff from 40 residential acres, the infiltration galleries below the street work together with:

- Aboveground bioswales
- Permeable pavement
- Cisterns
- Other LID features

Initial monitoring results show that this sustainable alternative increased local water resources while preventing downstream pollution.

In arid Los Angeles, this demonstrates how sustainable and LID techniques can strengthen partnership among nonprofits, municipalities, state and federal agencies, and local residents, while also providing environmental and aesthetic improvements for public/private spaces.

Santa Monica Main and Pico Branch Libraries

Location: Santa Monica, CA
Timeframe: 2006 and 2014, respectively

Despite recent drought conditions, the City of Santa Monica has been conscious of water use for over a decade.

In 2006, an approximately 50% reduction in outdoor potable water demand was achieved by:

- A 200,000-gallon cistern capturing and storing stormwater (retrofitted in the parking structure beneath the Main Library)
- Harvested water being filtered and reused for irrigation

In 2014, 80% of the new Pico Branch Library's toilet flushing and urinal demand was also offset by capturing, treating, and storing stormwater.

Together, the projects help Santa Monica work toward its aggressive goal to achieve water self-sufficiency by 2020. Located on highly frequented public property, the projects have also raised awareness and educated the public on the benefits of LID strategies.

LAStormCatcher

Location: Los Angeles, CA
Timeframe: July 2015 – July 2016

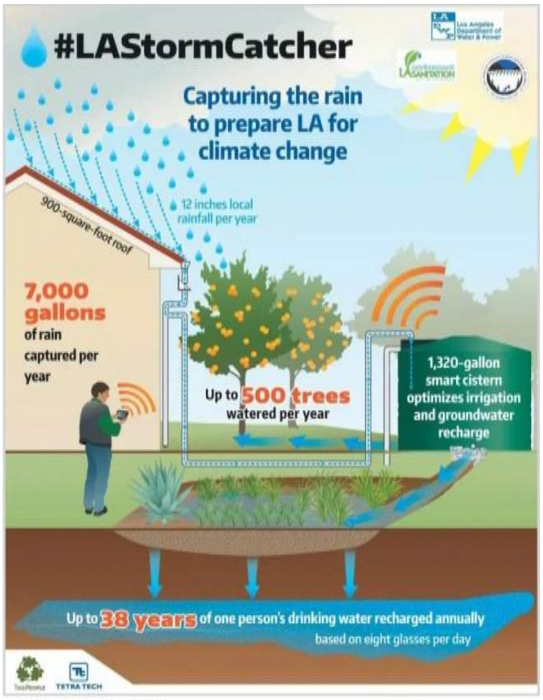


Photo Credit: TreePeople

The LAStormCatcher project combines stormwater harvesting practices with technological advances. This pilot-to-project initiative had multi-agency participation including the Bureau of Sanitation, the Department of Water and Power, and the DPW.

To maximize infiltration and reuse, homes are being retrofitted with:

- Cisterns
- Retention grading
- Swales

Each system is being evaluated among a range of real-time water-management scenarios that optimize the (sometimes conflicting) goals of the partner agencies while maximizing stormwater capture for on-site use by homeowners.

Over the course of a year, the project will test and evaluate the system function relative to water supply, water quality, and flood attenuation, and its effectiveness will be compared to other watershed control measures and strategies.

South Los Angeles Wetland Park

Location: South Los Angeles, CA
Timeframe: 2012

The South Los Angeles Wetlands Park is a repurposed bus and rail yard that now doubles as a public space and water treatment park.

To obtain cleaner water:

- Stormwater arrives by pipe drain
- A small treatment facility filters out larger contaminants
- Water circles around the park in an underground pipe
- Bacteria naturally clean the remaining pollutants

The cleaner water is then sent to the Los Angeles River and eventually out to the ocean.

The design removes pollutants from the water to create a healthier environment for residents and for the ecosystem. The design also adapts to flood and extreme drought through flexible operation features depending on water level.

Energy (E) Case Studies

Solar Farm Raises Groundwater in Antelope Valley

Location: Lancaster, CA
Timeframe: January 2013

The County Waterworks District No. 40, Antelope Valley, completed construction of a $2 million solar power system at its groundwater well facility in Lancaster.

The system of 1,372 PV panels:

- Generates about 760,000 kilowatt hours a year
- Fuels pumps for the two wells located on-site
- Draws approximately 1,500 acre-feet of groundwater a year

This investment in renewable energy:

- Significantly reduces GHG emissions at the site
- Provides enough water to meet the annual demand for 1,800 homes

In addition to reduced power costs, the District expects to offset its construction cost with $650,000 from the California Solar Initiative Program. Project construction was managed by District staff and the County's Internal Services Department, and completed by Chevron Energy Solutions.

Century Boulevard Mobility Improvement Project

Location: Inglewood, CA
Timeframe: 2010 – Present

AECOM provided preliminary engineering and final plans, specifications, and estimates using Civil 3D design software for improvements to Century Boulevard in Inglewood, a key transportation corridor east of Los Angeles International Airport and traversing the city.

The project includes several firsts for the city:

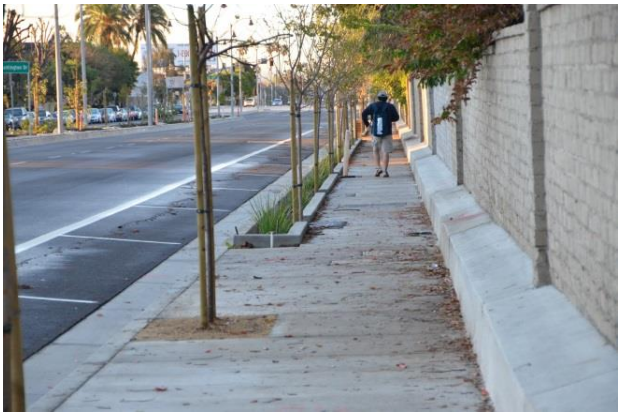
- LED street lighting
- Zero dependence on the County drainage system
- Corridor-themed wayfinding and signage
- Traffic signal interconnect system
- Traffic-calming features on a major arterial

AECOM's innovative design approach succeeded in providing increased roadway capacity while improving pedestrian access, roadway conditions, and safety.

Material (M) Case Studies

Rosemead Boulevard

Location: Rosemead, CA
Timeframe: 2014



The County worked with Caltrans, businesses, and residents to upgrade and renovate 2.5 miles of Rosemead Boulevard in the San Gabriel Valley.

Many multi-modal amenities were enhanced:

- A bike route
- New Americans with Disabilities Act curb ramps and sidewalks
- Bus pads and shelters

The pavement treatment, asphalt rubber hot mix, used:

- Recycled automobile tires

For each lane mile of roadway treated with recycled tire asphalt pavement, 2,000 tires were eliminated from going to the landfill.

Brandon Street and Green Street Project

Location: East Pasadena, CA
Timeframe: 2014

The Brandon Street and Green Street Project in unincorporated East Pasadena, California, received the 2015 “Outstanding Community Improvement Project of the Year” award.

The project successfully implemented:

- Permeable pavement (road, sidewalk, gutters)
- Stormwater capture
- Underground infiltration basin beneath the road
- Groundwater infiltration to reduce urban runoff

The pavement treatment, asphalt rubber hot mix, used:

- 3,500 recycled rubber tires

The project successfully facilitated multiple benefits through a combination of roadway improvements and stormwater capture features.

Eugene A. Obregon Park Project
Location: Los Angeles, CA
Timeframe: 2009

The Eugene A. Obregon Park Green Pilot Project is a joint 2009 Section Goal Project of the Parks and Recreation Development Division's Architecture & Design and Water and Conservation Planning Sections.

The installation of approximately 6,000 SF of solar panels:

- Reduces electricity consumption by over 20%
- Reduces CO_2 emissions by 40,000 pounds/year

The solar panels were designed for installation on the roofs of the gymnasium and pool house building.

Climate Mitigation and Resilience (CR) Case Studies

Sun Valley Watershed Stormwater Management

Location: Los Angeles County, CA
Timeframe: 2014

Photo: LA County

The Sun Valley Park, an underutilized park and flood-prone watershed, was converted into a flood mitigation, water quality treatment, and water conservation site. The following process occurs at the site:

- Runoff routed to primary water treatment facility
- Large contaminants removed
- Water directed to two underground infiltration basins
- Water naturally filtered
- Water recharged into underground aquifer

The design provides a public amenity, and the operational adjustments of water retention and detention levels address the impacts of both flood and drought scenarios due to climate change.

Surfers Point Managed Retreat

Location: Ventura, CA
Timeframe: 2011

Photo: RRM Design Group

The Surfers Point Managed Retreat area experienced 60 ft of erosion over a 20-year period, causing significant infrastructure damage. The following was conducted:

- Removed half of the existing, damaged parking lot to widen the beach by 60 ft
- Buried 26,000 tons of cobblestones under the sand to provide erosion protection
- Relocated the bike path 80 ft inland
- Constructed the parking lot 80 ft inland using permeable pavement
- Linked to new stormwater system (grass bioswale and stormwater filtration system)

The bike path and parking lot were relocated to address sea level rise, while the new stormwater filtration system allows the treatment of runoff before discharge into the estuary.

Redesign of 21st Street

Location: Paso Robles, CA

Timeframe: 2014

Photo: SRV Design

The City of Paso Robles was experiencing frequent flooding from an undersized stormwater drainage system, which was damaging the pavement and sidewalk, and affecting pedestrians and cyclists.

By using Green Street and Complete Street concepts, a natural open channel adjacent to the roadway was designed to:

- Infiltrate stormwater
- Improve safety and mobility for pedestrians/bicyclists
- Provide street trees for shade

For every rain event over 0.5 inch, the project is designed to retain and infiltrate over 50,000 gallons of runoff.

Construction (C) Case Studies

Angeles Forest Highway Project

Location: Angeles National Forest, Arcadia, CA
Timeframe: 2015

The Federal Highway Administration (FHWA) and the County rehabilitated 16.5 miles of the Angeles Forest Highway, brought the entire roadway to current standards, and incorporated safety enhancements.

The existing pavement was recycled to a depth of 3 inches using a CIPR treatment, and then 1½ inches of asphalt rubber hot mix was constructed over the CIPR pavement. Benefits included:

- Saved $2 million when compared to conventional hot mix alternative
- Extended the service life of the pavement for an estimated 10 years
- Reduced energy consumption by 72%
- Reduced GHG emissions by 74%
- Reduced landfill use by 10,000 cubic yards

This rehabilitation project improved the scenic mountain route while providing long-term sustainability, earning an award for Efficient and Sustainable Road and Bridge Preservation, Maintenance and Construction and Reconstruction Projects.

Willowbrook Project

Location: Compton, CA
Timeframe: 2014

The County reconstructed approximately 6 miles of residential roadways (983,000 SF) by paving 1½ inches of Asphalt Rubber Hot Mix (ARHM) on 3 inches of Cold Central Plant Recycled Asphalt Concrete Pavement (CCPRACP) over 8 to 10 inches of CSPB.

By recycling the existing AC and stabilizing the base/subgrade in place, the project:

- Eliminated hauling of existing AC and base from the site to a landfill
- Eliminated importing of new hot mix asphalt and base to the site
- Reduced construction and road closure time
- Lessened impacts to the community
- Reduced energy consumption by 68%
- Reduced GHG emissions by 57%
- Reduced landfill deposition by 60,000 tons
- Diverted 18,300 scrap tires from a landfill

By using CCPR and CSPB treatments rather than traditional reconstruction methods, this project became the leading example of the County's road reconstruction program.

Operations and Maintenance (OM) Case Studies

Retro-Reflective Signs (Facilities & Shared Services)

Location: Throughout Los Angeles County, CA
Timeframe: Ongoing

The DPW installed 1,200 retro-reflective signs on County-owned traffic signals. Retro-reflective non-illuminated technology maintains the required visibility of the directional signs to the driver without costly electricity.

Benefits include:

- 100% energy consumption decrease
- $96,000/year electricity cost savings
- $78,000/year maintenance cost savings
- Elimination of potential exposure to toxic chemicals in fluorescent lamps

By replacing the traditional and existing internally illuminated signs, DPW decreased both energy consumption and maintenance costs.

http://dpw.lacounty.gov/adm/sustainability/ProjectSP.aspx?id=61

Vehicle Safety Warning Beacons (Facilities & Shared Services)

Location: Throughout Los Angeles County, CA
Timeframe: Ongoing

DPW replaced halogen lamps with LED technology in traffic advisory light bars/beacons on vehicles. Prior to implementation, vehicle operators would typically leave engines idling during stationary work in field locations to prevent depleting the vehicle battery while operating the halogen rotating safety-warning beacons.

LED beacons:

- Use a fraction of energy consumed by halogen lamps
- Have a longer lifespan
- Are much more visible
- Have fewer maintenance or repair needs
- Result in $250,000/year fuel cost savings

By using LED beacons, vehicle motors can now be turned off when parked, which saves fuel and reduces emissions while continuing to alert motorists of the presence of work vehicles.

http://dpw.lacounty.gov/adm/sustainability/ProjectSP.aspx?id=62

Doublegrove Street Project

Location: West Covina, CA
Timeframe: 2015

The Doublegrove Street Project was the preservation of an entire neighborhood network consisting of approximately 27 lane miles of residential roadways (2.3 million SF) that were in fair to good condition.

The project integrated three innovative and unique approaches into a typical cape seal project (combination of the slurry seal and chip seal): micro-milling, use of 100% Reclaimed Asphalt Pavement (RAP), and Job Order Contract process (instead of low bid approach).

In comparison to equivalent service lives and costs of traditional hot mix treatments, the cape seal treatment:

- Saved $200,000
- Reduced GHG emissions by 85%
- Reduced energy consumption by 76%
- Reduced landfill deposition by 4,700 cubic yards

This is the 16th pavement preservation project successfully completed by the County in the last 5 years, and serves as a proven model for other agencies to adopt.

Sinaloa Avenue Project

Location: Altadena, CA
Timeframe: 2013

The Sinaloa Avenue Project was the preservation of approximately 31 lane-miles of residential roadway equivalent to 5.3 million SF of asphalt concrete pavement that was in good condition.

A slurry seal was applied to the road's surface, and RAP was used in the slurry rather than virgin aggregate. To improve the ride-ability of the road, prior to applying the RAP slurry seal, the contractor removed a thin layer (less than 3/8 inch) of the paved surface through micro-milling.

In comparison to a hot mix alternative, performing the slurry seal and using RAP:

- Saved $922,000
- Reduced GHG emissions by 91%
- Reduced energy consumption by 81%
- Diverted waste from a landfill

The project prolonged the life of the pavement and avoided having the road deteriorate to a point where resurfacing treatment would be required.

Small Buildings (<10,000 SF) Case Studies

Stoneview Nature Center

Location: Culver City, CA
Timeframe: 2010 – 2016

Disused urban space was reverted to its natural state and developed into the 4,000-SF Stoneview Nature Center. All materials from the existing site—including excavated asphalt from parking lots and demolished bricks and concrete—were reused on-site.

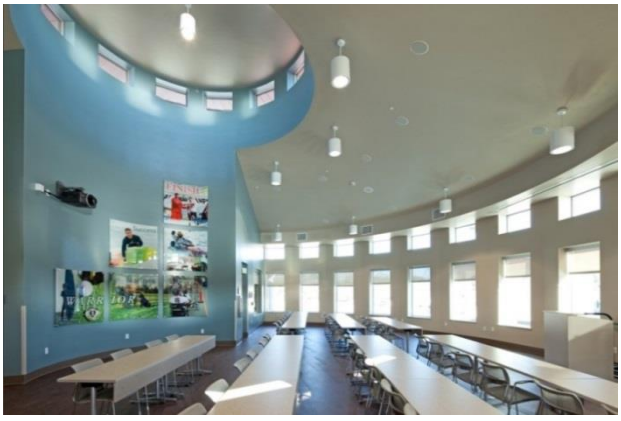
The entire project was funded by Regional Park and Open Space Prop A funds and Baldwin Hills Conservancy Prop 40 grant funds. The project implemented elements of the County's Green Building and Sustainable features in design and construction.

Features include:

- Multi-purpose room
- Staff offices
- Restrooms
- Open terrace
- Yoga deck
- Botanical garden
- Passive meadow
- Demonstration/community garden
- Native plant garden
- Nature grove
- Observation area
- Integrated public art
- Path to Playa Trail
- Surface parking

P-1100 Wounded Warrior Battalion Headquarters

Location: Marine Corps Base Camp Pendleton, CA
Timeframe: 2012



The P-1100 Battalion Headquarters facility is a LEED Platinum, two-story office and administration facility that serves the Wounded Warrior Campus on the Camp Pendleton Marine Corps Base in Oceanside, California.

The 11,957-SF facility incorporated high-level sustainable design and construction features:

- Concrete Masonry Units blocks
- Standing seam metal roof system
- R-19 batt insulation in the walls
- R-30 rigid insulation at the roof level
- High-efficiency glazing
- Clerestory windows
- Roof dormers
- Light wells and tubular daylighting devices
- Highly efficient mechanical lighting system
- LID strategies (on-site infiltration and recharge)
- 59-panel solar hot water heating system
- Low flow fixtures

The sustainable design reduced:

- Heat/cooling loads 50% over baseline
- Landscaping water consumption by 88.7%
- Potable water consumption by 45.5%
- A major portion of the hot water load

Metropolitan Transportation Authority Division 3 Maintenance Annex

Location: Los Angeles, CA
Timeframe: 2009 – 2010

Metro's Division 3 Maintenance Annex Building is a 12,500-SF LEED Gold certified facility built with a steel frame and masonry wall, which houses the functions of facilities maintenance, non-revenue repair, air conditioning repair, body repair, paint booth, welding and tire services.

Metro's investment of around $100,000 included:

- Generating construction debris as recyclable material
- Purchasing local or sustainable materials to reduce shipping emissions
- Using Amazon-friendly wood products
- Using special paints and near-ceiling level windows

The project achieved:

- 94% construction waste diversion
- 43% regional sourcing for building materials
- 10.5% improvement over the baseline building energy performance
- At least 35% of the building's electricity from renewable sources

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