Landscape Architecture Program (LAP)
Research Program Strategic Plan and Gap Analysis

Purpose: The strategic research plan is a tool that articulates the role of research and its value in the LAP. It is a dynamic document that can be updated and changed as research needs evolve. By highlighting research priorities and identifying research gaps, the plan promotes an efficient and effective research process.

Caltrans
Mission: **P**rovide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

LAP Research Program
Purpose: Advance landscape architectural practice and knowledge by researching and implementing state-of-the-art technologies and methodologies that balance mobility, safety, and maintainability with economic needs, adjacent land use and aesthetic, environmental, scenic and community values.

Sustainability
Goal: Develop standards and guidelines that improve the cost, efficiency and safety of ecologically-based sustainable roadside management practices

Erosion Control & Storm Water Pollution Prevention
Goal: Protect roadsides and improve storm water quality

Climate Change
Goal: Develop adaptation strategies to reduce the impacts of climate change

Soils
Goal: Protect and improve soil resources

Weed & Pest Control
Goal: Develop integrated best practices to prevent and control invasive & noxious species

Livability
Goal: Promote excellence in multi-modal transportation design that improves safety, mobility, economics and maintenance

Context Sensitive Solutions
Goal: Protect & enhance the ____through a collaborative approach involving all stakeholders

Aesthetic Values
Goal: Protect & improve aesthetic values visible from & to transportation facilities

Safety
Goal: Improve traveler & worker safety through design

Landscape Design
Goal: Promote environmental stewardship of the natural and constructed roadside

Highway Planting
Goal: Improve planting & vegetation success

Irrigation
Goal: Conserve water & reduce irrigation life-cycle costs

Landscape Construction
Goal: Improve landscape construction methods

Sustainability

LAP Research Projects

Erosion Control & Stormwater Pollution Prevention

Goal: Protect roadsides & improve storm water quality

Objectives
1. Control roadside erosion & slope failures
2. Reduce discharge of pollutants to storm drainage systems
3. Comply with permit requirements
4. Improve soil structure
5. Integrate context sensitive stormwater treatment facilities
6. Treat stormwater runoff

Objective	Research Project
1, 2, 3, 5, 6	ID different types & methods of rain water harvesting (micro basins, cisterns, landscape grading, etc)
1, 2, 3, 5, 6	ID how to monitor water quality & usage of rain water harvesting methods to meet water conservation needs, improve revegetation & improve groundwater recharge (Part 2)
2,3,6	Impacts or value of leaf litter from trees on water quality & storm water treatment BMP performance
1,2,3,4,6	ID best practices & strategies in effective soil stabilization, post fire remedies along state right-of-way

Climate Change

Goal: Develop adaptation strategies to reduce the impacts of climate change

Objectives
1. Reduce potential impacts of climate variability on highway roadsides
2. Contribute to the State's greenhouse gas emission reduction plan

Objective	Research Project
1,2	Best practices in determining & developing methods to ID & track carbon sequestration credits from roadside vegetation
1,2	ID, locate & implement alternative fueling stations (electric or battery charging stations) for public use

Weed & Pest Control

Goal: Develop integrated best practices to prevent & control invasive & noxious species

Objectives
1. Identify & control noxious weeds
2. Reduce herbicide use
3. Reduce recurrent maintenance activities
4. Preserve habitat
5. Develop stakeholder partnerships
6. Control unwanted vegetation
7. Minimize fire hazards
8. Preserve roadside native plants

Objective	Research Project
3,4,5,6,8	ID risk & correlation between increased pests issues related to trees & shrubs & drought or water conservation practices to maximize plant health while reducing water usage
1,2,3,6,7	Review & develop improved strategies for roadside vegetation control by Design of permanent vegetation control treatments along the 'fire strip'
1,2,3,6,7,	ID effective sealant types for concrete and asphalt cracking to prevent weed growth to reduce pesticide used along the state highway

Livability

LAP Research Projects

Context Sensitive Solutions

Goal: Protect & enhance the environment & quality of life through a collaborative approach involving all stakeholders

Objectives
1. Develop non-motorized transportation expertise
2. Improve connectivity of bike/ped infrastructure
3. Comply with ADA requirements
4. Facilitate relationship building with internal & external stakeholders
5. Prevent project delays, re-design & cost over-runs
6. Quantify economic benefits to communities
7. Develop design flexibility guidance
8. Implement corridor master plans
9. Quantify economic value of pollution removal services provided by landscaping

Objective	Research Project
1,2,3,4,5,6, 7,8,9	Define sustainability practices and identify how to integrate sustainability performance measures into Caltrans investment and operation decisions *(existing write up)*
1,2,3,4,5,6, 7,8,9	Identify best practices of cost savings from the use of sustainable practices in highway development

Aesthetics

Goal: Protect & improve aesthetic values visible from and to transportation facilities

Objectives
1. Improve appearance & safety of roadside appurtenances
2. Protect scenic quality of transportation corridors
3. Quantify the value of aesthetics

Objective	Research Project
1, 2, 3	Lessons learned by other DOTS on their statewide aesthetic corridor master plan. Is it an effective planning tool, how were they funded, and how were guidelines developed

Safety

Goal: Improve traveler & worker safety through design

Objectives
1. Reduce maintenance worker exposure to motorized traffic
2. Reduce conflicts with vehicles & roadside appurtenance
3. Minimize fire hazards
4. Improve security at Safety Roadside Rest Area
5. Improve traveler stopping opportunities

Objective	Research Project
1, 5	Review Federal, Departmental & other policies or mandates to determine and identify the types of wildlife that cross Caltrans right of way, percent killed each year *(Part I)*
1, 5	Review other DOTs wildlife passage policies, guidelines, funding sources, and design standards (based on type of wildlife that crosses Caltrans right of way) as part of highway projects *(Part II)*

Landscape Design

LAP Research Projects

Highway Planting

Goal: Improve planting & revegetation success

Objectives
1. Establish desirable vegetation in the R/W
2. Comply with permit requirement for revegetation & mitigation
3. Develop sustainable landscapes

Objective	Research Project
1,2,3	Identify, prioritize, and document electronically, high water landscape areas (acres, location) statewide to be converted to low water conservation planting and irrigation for water savings, programming and determine SHOPP needs

Irrigation

Goal: Conserve water & reduce irrigation life-cycle costs

Objectives
1. Reduce maintenance of irrigation systems
2. Reduce need for supplemental irrigation
3. Improve irrigation efficiency & reliability
4. Reduce irrigation construction costs

Objective	Research Project
1,2,3,4	Current state of the practice for merging aerial and mobile LiDAR data sets together in a single searchable database (GIS) for inventory of all landscape elements along state right of way

Landscape Construction

Goal: Improve landscape construction methods & reduce construction costs

Objectives
1. Improve cost estimating practices
2. Reduce contract change orders
3. Incorporate recycled products
4. Reduce construction worker exposure to traffic
5. Insure timely project completion
6. Increase bidder interest in projects

RESEARCH PROCESS AND FUNDING CYCLE

National Cooperative Highway Research Program (NCHRP)

- May: Formal request to others for new research proposals or evaluate existing research and rank priority
- July: Prepare new NCHRP project problem statements for funding consideration in next FY (Use NCHRP Problem Statement Outline format)
- August: Work with executive management and DRISI on proposals
- September: Share proposals with NCHRP committee and TRB panel committee to gather support on research topics and proposals
- October 15: Submittals due.
- March: NCHRP announces problem statements selected for next FY

- Information on NCHRP can be found at: http://www.trb.org/NCHRP/Public/NCHRP.aspx

American Association of State Highway Transportation Officials (AASHTO)

- May: Formal request to others for new research proposals or evaluate existing research and rank priority
- July: Prepare new AASHTO domestic Scan proposal for funding consideration in next FY (Use AAHSTO Domestic Scan proposal format)
- August: Work with executive management and DRISI on proposals
- September: Share proposals with Standing Committee on Design (SCOD) to gather support on research topics and proposals
- October 15: Submittals due no later than the 15th. Submit online at: http://web.transportation.org/nchrp/20-68A/Submit.aspx

- Information can be found at: http://www.domesticscan.org/what-makes-a-good-scan-topic-proposal

Division of Research, Innovation, and System Innovation (DRISI)

- April: Formal request to TAP for new research proposals or evaluate existing research and rank priority
- May: Share proposals with HQ Staff & gain support for proposals & rank¶July: Coordinate with DRISI and executive management in maintaining and updating the Design/Construction Preliminary Investigation (PI) Check List
- July: Coordinate with TAP on updates or new research PI topic proposals
- Quarterly: Provide updates or new proposals to DRISI at the quarterly task review meeting
- Ongoing: Write up and submit a detailed PI once approved by TAP, DRISI and Division of Design
- Per queue: PI contract awarded to consultant

- Information can be found at: http://www.dot.ca.gov/newtech/researchreports/preliminary_investigations/index.htm