ABSTRACT

Concurrent with ongoing initiatives to take a contextual or “Context Sensitive Solutions” (CSS) approach to highway design and construction, there is an increasing emphasis on engaging a broad set of issues related to environmental and social sustainability in developing and improving highways. The Hawaii Statewide Highways Sustainable Landscape Master Plan and associated Roadside Design Guide represent a concerted effort to make the state of Hawaii’s roadways and roadside landscapes more sustainable and contextual. The Master Plan and Design Guide are an expression of traditional Hawaiian values of Pono (resource protection and replenishment), Kuleana (shared responsibility), and Lokahi (human well-being). The documents are intended to make highways, and those who plan and design them, more respectful of the sensitive landscapes and local culture of the Islands.

The Master Plan and Design Guide—which augments extant literature on “sustainable best practices” in the planning, construction, and maintenance of roads—fosters a systems-thinking and cultural landscape approach to every highway improvement project. The Master Plan and Design Guide address how roadways and roadsides affect the larger landscape, local ecosystems, and social setting. Basically, the documents promote sustainable elements and treatments that will integrate streets, roads and highways with their various settings while eliminating or lessening a roadway’s negative environmental effects. Recommendations and guidelines are provided for a broad suite of issues and considerations including water quality and resources, wildlife movement and habitat, vegetation, multi-modal travel, land use and access, aesthetics, tourism and recreation, maintenance, and local economic activity.

Because each highway is in a different landscape setting with a different set of issues, the Master Plan relies on a watershed spatial framework to subdivide the Hawaiian Islands into distinct cultural landscapes for better comprehension of local contexts and natural ecosystems. This watershed framework meshes with the ancient Hawaiians’ system of using large watersheds (Moku) and smaller watersheds (Ahupua’a) for land management and political purposes. From this enhanced understanding of setting or context, the plan redefines highways throughout the entire state according to their setting. Thus a two-lane “rural arterial” is more accurately defined as a Sea-cliff Scenic Byway, Coastal Farmland Road, or Shoreline Residential Drive, with important distinctions as to highway improvements and roadside treatments for these different highway types.

The Master Plan and Design Guide integrate landscape-level, sustainable considerations and guidance into the Hawaii Department of Transportation’s (HDOT) project design and delivery process by applying sustainable recommendations to specific locations and conditions. Faced with limited resources, lengthy permitting requirements, and multiple steps in project delivery, HDOT simply cannot implement a full-blown CSS process for every project nor conduct the research on sustainable best practices for every design decision and situation. With performance metrics, the Hawaii Statewide Highways Sustainable Landscape Master Plan and Roadside Design Guide constitute a reliable source of sustainable and contextual solutions to the dozens of highway projects that HDOT and its consultants undertake every year. As such, the documents provide a practical framework for other DOT’s and highway planning professionals who are pursuing sustainable and contextual approaches for developing and improving highways.
INTRODUCTION

The Need for a Sustainable Master Plan

It can generally be said that driving a motor vehicle offers an enjoyable and rewarding experience despite the occasional frustrations of traffic congestion, tedium, and mishaps. It is also an accepted truism that our Hawaiian Islands qualify as one of the most beautiful and lovely places on earth. Driving the Hawaiian Islands thus equals an unrivaled experience in exploration, discovery and enjoyment; millions of visitors drive our islands yearly and many of their most memorable moments are from behind the wheel. Local residents too never seem to tire of the spectacular land and sea vistas that unfold from the road.

Hawaii’s highway system by and large meets locals’ and visitors’ transportation and mobility needs. Yet all is not well in our fragile and isolated paradise. Our highway system has numerous deficiencies, and many roads and highways threaten the environment and quality of life that both Hawaiians and visitors hold dear. Highways and the traffic they carry pollute our air and water, damage streams and shorelines, impede wildlife movement, divide neighborhoods, and spread noxious weeds. Some highways are overcrowded or hazardous, while others don’t safely accommodate those who walk, bicycle, or use transit. Moreover, we continue to invest increasing amounts of money and resources on highway design, construction and maintenance without significantly improving local economies and fostering community cohesion.

Hawaii’s highway system must adapt to meet the challenges of protecting our environment and communities while serving the transportation needs of future generations. The Sustainable Landscape Master Plan helps meet these challenges by addressing some of the environmental, social and economic pressures confronting the state’s highway system. The plan enables the Hawaii Department of Transportation (HDOT) to alleviate the problems of unsustainable highway development by integrating landscape level, sustainable guidance and practices into HDOT’s highway design and project delivery process.

Given all the information that currently exists on sustainable highway development and operation, it might be asked why does Hawaii DOT need its own master plan and set of guidelines on sustainable landscape practices. The simple answer is that sustainable practices must be tailored to fit particular places and conditions in order for guidelines and practices to be effective. The wide range of sustainability manuals and documents available from other sources provide good precedents, justification, and parameters, but the indisputable value of a master plan is the direct, not hypothetical, identification of sustainable practices for specific locations and conditions. This Master Plan and Roadside Design Guide for Hawaii’s highways takes away much of the guesswork in evaluating and applying sustainable practices, thereby simplifying the job of the HDOT and its consultants.

Because sustainability encompasses social, environmental, and economic dimensions – the so-called triple bottom line of sustainability – many factors must be addressed in making roadside landscapes sustainable. Roadside consist of many things and perform many functions. The roadside can also be viewed as the transition zone between the roadway and adjacent landscape. Sustainable best practices in the master plan and associated design guide thus speak to issues of grading and drainage, storm water treatment, vegetation, wildlife movement, noise buffering, visual screening, safety, travel mode, access, aesthetics, maintenance, construction cost and many other issues for a variety of road types in different settings.
PLAN GOALS & APPROACH

Systems-thinking is an underlying premise of sustainable policy and practice. Systems-thinking considers how different elements interact with each other in the context of the larger whole. One application of systems-thinking is how we look at nature where plants, animals, water, rocks, climate, etc. are all interconnected and interdependent within a larger ecosystem. Systems-thinking holds that elements or actions must be framed in terms of their relationship to other things and the larger system if the health and well-being of the larger system and its constituent parts are to be maintained. This Sustainable Landscape Master Plan incorporates a systems-thinking approach by looking at highways and highway components in relationship to the larger landscape whole.

“Landscape” comprises everything of and on the land including streams, shorelines, historic buildings, farms, neighborhoods, plants and animals. The term “cultural landscape” recognizes that people and their actions have been shaped by and have shaped the natural landscape. Hawaii is teeming with cultural landscapes where wonderful interplays of culture and nature are often apparent. Hawaii’s cultural landscapes are wholly unique and are what make the state so compelling to visitors.

The over-arching goal of the Master Plan is to foster a systems-thinking approach and cultural landscape perspective for every highway improvement project. Every action, or even inaction in some instances, has potential environmental and social consequences within the context of the larger whole. Acknowledging and addressing these consequences is at the root of making highways more sustainable and contextual.

The following goals and objectives describe what is to be generally accomplished by the Hawaii Statewide Sustainable Landscape Master Plan:

1. Protect and Restore Natural Resources and Environmental Quality
   - Preserve and avoid damaging natural resources and ecosystems
   - Repair damaged landscapes – streams, wetlands, shorelines, hillsides, etc.
   - Maintain or re-establish wildlife habitat and travel corridors
   - Promote the use of native plants and control invasive plants
   - Reduce energy and resource consumption for highway construction, operation, and maintenance

2. Provide a High Quality and Uniquely Hawaiian Experience for Highway Travelers
   - Improve highway safety and operation
   - Accommodate different travel modes including auto, bicycle, walking and transit
   - Access and highlight recreational places and resources
   - Protect and improve scenic quality
   - Provide information about local attractions, culture and history
   - Heighten one’s awareness about sense of place and Hawaii’s unique cultural landscapes

3. Support Local Communities and Economic Activity
   - Maintain and improve community quality of life
   - Support local businesses and economic activity: tourism, agriculture, retail commerce, etc.
   - Protect cultural and historical resources and reflect or highlight local cultural identity
   - Adapt the highway to the community setting and to support community dynamics
   - Involve local communities and neighborhoods in decisions about highway improvements
4. Foster an Integrated and Inclusive Highway Planning and Design Approach

- Consider and address all issues in project planning and design
- Promote coordination among state, federal and county agencies, community organizations, environmental groups, and other interests
- Encourage the creation of multi-disciplinary planning/design teams for projects
- Integrate a sustainable and context sensitive methodology into the project delivery process.

**SUSTAINABILITY & CONTEXT SENSITIVE SOLUTIONS**

For the past twenty years, the Federal Highway Administration (FHWA) and most state DOT’s including HDOT have promoted a context sensitive solutions (CSS) approach to the planning and design of highways. CSS looks beyond a highway’s functional requirements and stipulates that the highway fit its setting while preserving or improving natural, cultural and scenic resources and addressing or enhancing community economies, multi-modal travel, and sound land-use practices. CSS also stipulates that “context” be considered at the beginning of the project and that contextual issues have equal standing with functional considerations. The CSS approach is essentially comprehensive and addresses all substantive issues; CSS is not about highway decorations and embellishments. For example, the implementation of wildlife crossing structures constitutes a legitimate CSS response to wildlife movement across and along a highway whereas bas-relief silhouettes of animals and fish cast into concrete bridge abutments and railings is not an effective CSS response to wildlife movement.

To a large extent, context sensitive outcomes are sustainable as well. If a project is planned and designed through a CSS process to be “in harmony with the community and preserve environmental, scenic, aesthetic, historic, and natural resource values” and to add “lasting value to the community and the environment”, then the facility will embody sustainable practices. By the same token, sustainable practices must be directly applicable or sensitive to the social and environmental context to be truly sustainable.

Burdened with insufficient resources, lengthy permitting requirements, and multiple steps in project delivery, HDOT and its consultants simply cannot take a full-blown CSS approach to every project. However, HDOT does need a way to make every project more sustainable. The Master Plan provides this capability by providing a set of place-based/corridor-specific sustainable recommendations and guidelines. While the master plan should not be seen as a substitute to a CSS process, particularly for larger projects, the plan can be used as a shortcut to finding contextual and sustainable solutions to the dozens of highway improvement projects that HDOT undertakes every year.

**LANDSCAPE FRAMEWORK & HIGHWAY CORRIDOR TYPE**

The Master Plan’s sustainable best practices and recommendations hinge on the cultural landscape context or setting for each highway. Therefore a method was needed for identifying and distinguishing each island’s different cultural landscapes. A landscape framework of watersheds was used to partition each island into a series of landscape districts for better understanding and discussion of the landscape context. Historically the Hawaiian Islands were divided by the ancient Hawaiians into large watershed districts (Moku) and smaller watershed units (Ahupua’a) for land management and political purposes, and the Moku districting is still somewhat in use today for resource management and land planning. Within this landscape framework of Moku watershed districts, various landscapes are seen to possess distinct vegetarian types, terrain features, land use patterns, and other characteristics that can be used to differentiate highway corridors from one another based on their setting.
The Master Plan provides a brief overview of each island’s *Moku* districts (see Fig. 1). Although cursory, this overview makes apparent the wide diversity of each island’s natural landscapes which range from tropical rainforest, mesic forest, and subalpine woodland to coastal estuary, dry shrub-land, and desert. The *Moku* assessment also helps to differentiate levels of human activity and land use such as farming and ranching, major metro areas to small towns and villages, nature preserves and recreational land. Importantly, what emerges from this *Moku* overview is the amazing variety of Hawaii’s cultural landscape contexts where current and historic human activity and development are often predicated on the land’s intrinsic qualities and characteristics.

**Ko‘olaupoko Landscape Features**

The following landscape features are prevalent throughout Ko‘olaupoko Moku and thus can be considered characteristic of this moku district. These features or aspects of these features, when incorporated or preserved in the development of highway improvements, will help to integrate the highway with its setting and make for a more sustainable highway.

- **Meandering, free-flowing streams**
  - Natural bottom and vegetated banks
  - Uninterrupted connection to estuaries or ocean

- **Lushly vegetated slopes**
  - Irregular (not uniform) sloping surfaces
  - Dense plant cover on moderate to steep grades

- **Stable (un-eroded) shorelines**
  - Broad sandy or rocky beach and inter-tidal area
  - Plants on upper beach

- **Exposed natural rock**
  - Along beaches
  - On steep slopes and cliffs

- **Low-rise, residential & commercial development of consistent scale & materials**
  - Tree-lined streets & roads
  - Forested lower slopes of mountains
  - Manicured golf courses
  - Mix of ornamentals in neighborhoods, commercial areas, & parks

**FIGURE 1** The general characteristics of each Moku district are described in the master plan to help frame the setting and context for each highway corridor within the district.
In giving Master Plan users a better understanding and appreciation of context, the plan essentially describes and maps state roads and highways in terms of their settings. In addition to setting, terms to describe the highway corridor also make reference to the type of the road facility; i.e. street, expressway, road, boulevard, byway, etc. So for example a narrow two-lane highway in a largely agricultural landscape might be defined as a Coastal Farmland Road or an Upcountry Ranchland Byway, and a highway passing though a small town commercial district is designated a Town Main Street. Based on setting again, sustainable best practices for the roadside landscape and roadside elements are readily assigned. The following is a sampling of highway corridor types identified in the plan that reflect both the landscape setting and road facility type:

<table>
<thead>
<tr>
<th>Plantation Highway</th>
<th>Village Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Residential Drive</td>
<td>Resort Coast Boulevard</td>
</tr>
<tr>
<td>Sea-cliff Scenic Byway</td>
<td>Metro-Area Freeway</td>
</tr>
<tr>
<td>Town Main Street</td>
<td>Trans-Mountain Parkway</td>
</tr>
<tr>
<td>Coastal Farmland Road</td>
<td>Downtown Boulevard</td>
</tr>
<tr>
<td>Community Parkway</td>
<td>Seaside Drive</td>
</tr>
</tbody>
</table>

**MASTER PLAN ORGANIZATION & RECOMMENDATIONS**

The Master Plan is divided into four volumes in which there is a master plan document for each of Hawai‘i’s four main islands – Oahu, Maui, Kauai, and Hawai‘i. Dividing the plan into four documents recognizes that each island is different, and it correlates with HDOT’s organizational structure of a division office for each island. A separate Master Plan for each island also keeps each document leaner and easier to use.

Each island’s Master Plan contains a series of maps showing the highway corridor types for that island’s separate Moku districts. The sample map (Fig. 2 on page 7) depicts the highway corridors in the Ko‘olaupoko Moku district on the island of Oahu. The Master Plan provides a representative photo of each corridor type with descriptive text, drawings and other photos highlighting the iconic elements and features that currently characterize the roadside and larger corridor (see Figures 3 & 5). Some of these features and elements have sustainable and contextual value while other elements contribute little or may even diminish sustainability. Additional annotated drawings and photos emphasize the sustainable and contextual elements that are worthy of protection and perpetuation while other illustrations provide recommendations for improving or modifying certain elements (Figures 4 & 6). A “Materials and Finishes Palette” offers specifics on appropriate roadside plants and other elements for each corridor type. All recommendations are based on sustainable best practices promoted by numerous agencies and organizations including HDOT.
FIGURE 2  Hawaii’s highway system consists of facilities ranging from multi-lane urban freeways to narrow two-lane rural roads. Regardless of size and capacity, each highway corridor is identified and mapped in terms of its larger (Moku) setting and its local context.
The Master Plan utilizes photographs and simple sections of existing highway segments to emphasize the contextual (and often sustainable) features and characteristics that currently may occur along each highway corridor type.
FIGURE 4 If HDOT is planning a safety or operational improvement (turn lanes, shoulder widening, guardrail, etc.), the master plan emphasizes preserving and/or improving existing features and elements that contribute to the highway’s contextuality and sustainability.
In another example here, a highway through a small town commercial core is characterized as a Town Main Street, with call-outs of various elements that either contribute to or detract from the Main Street quality.

As represented by the Master Plan examples and excerpts in this paper, the entire state highway system on each island is mapped (on a Moku by Moku basis) and segmented by corridor type (per setting), with sustainable landscape best practices assigned to each corridor. As might be imagined, there are a number of different corridor types on each island, but the number is actually quite manageable and ranges from only fourteen to twenty corridor types per island. If HDOT is planning even a modest safety or operational improvement for any state highway on any island, the master plan calls out sustainable and contextual roadside improvements that are sometimes overlooked or not considered in the planning/design process.
FIGURE 6 If HDOT is planning to do anything here, the recommendations above (as well as others not pictured) are encouraged from the standpoint of sustaining the charm and economic vitality of this rural town’s downtown core.
STORY PLACES

Interpretation strengthens the connections between people and place. By broadening visitors’ perceptions of the places they visit for recreation and enjoyment, interpretation expands the capacity for people to understand and care for a place.

Hawaii’s highways bring people near and into contact with an astonishing array of cultural resources and landscapes. Places and landscapes revered by the ancient Hawaiians (and still venerated by Hawaiians today) often lie next to or within sight of a highway. Fishponds, peninsulas, mountain peaks, small islands, streams and coves often have wonderful Hawaiian stories associated with them. The Master Plan for each island contains a brief inventory of “Story Places” that can potentially be interpreted through various means in roadsides and in roadside pull-offs and parks. Hawaiians’ respect and stewardship for the land and water is revealed by their gods’ connections to these places.

FIGURE 7a Interpreting the “Story Places” along highways will make the travel experience more enjoyable and help people understand and care for the unique cultural landscapes and the larger environment.
FIGURE 7b Each Story Place is associated with a beautiful message summarized in the Master Plan. Messages and stories can be interpreted to further immerse people in the culture and ecology of the islands.
ROADSIDE DESIGN GUIDE

The Roadside Design Guide (RDG) supports the Master Plan by providing a collection of sustainable best practices and recommendations that are applicable to multiple corridor types and roadside conditions. Basically the RDG offers clarification on practices contained in the master plan and includes practices that pertain to many different corridor types. The Master Plan cross-references the RDG material that is applicable to a corridor type.

The roadside is essentially the strip of land between the roadway edge and the right-of-way line; medians are also considered roadsides. Roadside areas and elements perform many important tasks vital to the operation of the highway. Perhaps the most important function of the roadside is safety enhancement whereby roadside barriers, recoverable zones, and sight distance figure prominently in the design and safe operation of the road. Other crucial roadside functions and elements include drainage, property access, grade transition, sound and visual buffering, other travel modes (walks, bike paths, transit stops), lighting, travel information, fencing, vegetation, and utilities. To some extent, the roadside can also be viewed as the transition zone between the roadway and the landscape beyond the right-of-way line. Transitional elements range from pronounced features such as steep slopes and high noise walls to the more subtle such as residential sidewalks and shade trees.

Clearly the design and treatment of the roadside can do a lot to integrate the highway with its setting and to lessen or eliminate the negative environmental effects of the highway. Basically the roadside can be a catalyst for making the road more sustainable (and hence that is why roadsides are the focus of this master plan and RDG). Roadside swales can reduce the contaminants in roadway run-off before they reach streams and estuaries. Roadside sidewalks and paths can provide safe places for kids to walk and bicycle to and from school. And roadside vegetation can create shade, provide wildlife cover, filter air-borne pollution and screen unattractive areas. Basically, the roadside is where much good can be accomplished in “stitching” the transportation facility into the larger landscape fabric of neighborhoods, towns, farms, nature preserves, parks, etc.

Figures 8 to 13 on the following pages contain excerpts from the RDG.

**FIGURE 8** *Wai* means water, and many places – e.g. Waimanolo, Wailua, Waikiki – are named for their fresh water streams and resources. The guidelines above (and many others) provide recommendations for making highways respectful and protective of the islands’ valued water resources.
FIGURE 9 Several shoreline highways are jeopardized by coastal erosion. Guidelines offer a “living shoreline” alternative to HDOT’s conventional shoreline armoring and structural bulkhead systems.

FIGURE 10 The Master Plan and Roadside Design Guide provide thorough and detailed data on the use and value of plants (particularly native species) in highway corridors.
Major Structures

MS - 6
Avoid side-by-side bridges and viaducts

Unseparated or side-by-side wide bridges and viaducts restrict air, light, plant diversity, aquatic life, and human activity and travel beneath them. If there is sufficient right-of-way, wide bridge structures should be separated to:

- Permit more light and rain to reach the ground
- Allow a greater diversity of plant species and size at ground level.
- Permit better movement of wildlife in habitat areas.
- Reduce mass and scale, and create a more comfortable condition for people walking (or driving) beneath the structures.

Example of separated viaduct structures: Nimitz Highway, Honolulu

Side-by-side structures cast a wide light/rain shadow beneath structures

A moderate gap between structures can reduce the light/rain shadow by up to 40%

Provide a Moderate Gap or Separation Between Long, Wide Bridges & Viaducts

FIGURE 11 Honolulu’s major freeways contribute to many problems throughout the greater metro area. Guidelines like the one above address how massive highway structures can be made more compatible (visually, acoustically, environmentally, functionally) with their setting.
Certain state highways eventually will require reconstruction along new alignments. Something as straightforward as fitting a road with existing terrain features has sustainability benefits that are often overlooked.
**Roadside Pull-offs & Interpretive Elements**

Roadside pull-offs are as ubiquitous along Hawaii’s highways as the spectacular island scenery. Pull-offs are especially common along coastal highways where access and parking for beaches, parks and scenic vistas seem to occur every half mile or so. Unfortunately, many pull-offs suffer from poor surfacing, inconsistent edge treatment, neglected landscaping, and inadequate visitor amenities.

As important as they are to both visitors and local residents, pull-offs need to compliment their setting and reflect a measure of environmental stewardship and care. Various facilities ranging from trash receptacles to interpretive exhibits should be considered at pull-offs. HDOT should coordinate with other agencies (particularly State Parks) to provide or improve pull-offs at recreational and scenic areas. The following guidelines provide direction for pull-off development and improvements.

**RP-1**

*Improve or develop safe and attractive roadside pull-offs to access parks, trails, benches, and points of interest*

Because they will remain in the roadside cross-section in many areas, pull-offs should adhere to the following basic guidelines:

- Provide a consistent edge barrier or treatment for the entire length of the pull-off
- Provide a stable, compacted and uniform parking surface, flush with the edge of the shoulder

**RP - 1A: Roadside Pull-Off (Buffered)**

- Provide enough distance or width for safely opening car doors and pedestrian movement (see RP-1C)
- Provide signage informing motorists of pull-off

**RP - 1B: Roadside Pull-Off (Unbuffered)**

- Edge barrier (of consistent type or treatment) See RP-3
- Parallel parking slots
- Drive aisle
- Planter strip as buffer

FIGURE 13 Motorists (both tourists and visitors) will park wherever there’s a flat, open spot in the roadside, especially at beaches and other attractions. Guidelines provide direction on how to make pull-offs safer, environmentally better, and appealing with visitor amenities such as interpretive exhibits.
MEASURING SUSTAINABILITY: PONO-METRICS

Having a way to score the value of sustainable best practices will be important to many users of the Sustainable Landscape Master Plan and Roadside Design Guide. Therefore a modest scoring system or metrics was developed to meet this need. The scoring aligns with the principles and goals of the Master Plan whereby sustainable practices are rated according to their perceived level of Pono-ness; that is, how well they fit with the aina (land) and respect local environments, communities, and culture. Figure 14 on this page shows the point system and scoring levels for the Pono-metrics system.

<table>
<thead>
<tr>
<th>Pono-Premium Practices</th>
<th>3 points each</th>
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<tbody>
<tr>
<td>It could be argued that sustainability is ultimately about preserving, protecting and restoring natural ecosystems and resources. All life forms are dependent upon and linked together in complex natural systems, and all organisms including humans benefit from and thrive in clean, healthy, productive, and diverse environments. The value of ecosystem services is incalculable, and, for Hawaii, healthy lands and waters are everything, not to mention that respect and protection of the land is at the core of Pono. Therefore, sustainable practices and guidelines that directly improve natural systems and resources are given the highest priority and highest score in the metrics system for this master plan. Incorporation and implementation of the following practices will garner 3 points each.</td>
<td></td>
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<tr>
<td>Storm water run-off treatment</td>
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<tr>
<td>Soil erosion control</td>
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<tr>
<td>Topsoil preservation</td>
<td></td>
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<tr>
<td>Stream bank &amp; channel protection/restoration</td>
<td></td>
</tr>
<tr>
<td>Shoreline/Beach protection and restoration</td>
<td></td>
</tr>
<tr>
<td>Native plant protection and restoration</td>
<td></td>
</tr>
<tr>
<td>Invasive plant control</td>
<td></td>
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<tr>
<td>Fish &amp; wildlife habitat protection and restoration</td>
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</table>

<table>
<thead>
<tr>
<th>Pono-Preferred Practices</th>
<th>2 points each</th>
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<tbody>
<tr>
<td>The environmental, social, and economic dimensions – or triple bottom-line aspects – of sustainability are without doubt interconnected and intertwined. If a sustainable practice has lasting social value, it will likely have inherent environmental or economic value as well. Certain sustainable practices exhibit an obvious combination of social, economic, and environmental benefits, and while Pono-Preferred Practices are not ranked as high as Pono-Premium Practices, the preferred guidelines nonetheless provide important benefits involving some combination of improved human well-being and quality of life, economic enhancement, or environmental stewardship. Each of the following practices, when implemented in a project, earns 2 points:</td>
<td></td>
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<tr>
<td>Multi-modal travel facilities</td>
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<td>Main street treatments/enhancements</td>
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<tr>
<td>Protection and restoration of roadside plants, walls, etc. in residential areas</td>
<td></td>
</tr>
<tr>
<td>Improvements/enhancements to recreational areas (scenic pull-offs, beach and trail access, etc.)</td>
<td></td>
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<tr>
<td>Noise wall structures</td>
<td></td>
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<tr>
<td>Shade tree plantings in urban and suburban settings</td>
<td></td>
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<tr>
<td>Plants requiring no irrigation in rural areas and little to no irrigation in urban settings</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pono-Performing Practices</th>
<th>1 point each</th>
</tr>
</thead>
<tbody>
<tr>
<td>While Pono-Performing Practices are valued at only one point each, they can make significant contributions to the broad mix of issues and factors affecting environmental and social sustainability. Performing guidelines and practices mostly address issues of cultural understanding and expression, aesthetics, sense of place, and experience enhancement. These practices essentially are intended to promote an appreciation of place (and a desire to care for it), a respect for natural beauty and scenery (and attention to not messing it up) and an understanding of local cultures (versus disregarding or ignorance). Cumulatively, the implementation of a few of the following practices will enhance overall sustainability:</td>
<td></td>
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<tr>
<td>Burial or relocation of overhead roadside utilities</td>
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<tr>
<td>Identification and interpretation of Story Places</td>
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<tr>
<td>Use of tinted steel guardrail or other system in lieu of W-beam</td>
<td></td>
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<tr>
<td>Reduced or minimal highway lighting in rural settings</td>
<td></td>
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<tr>
<td>Sign identification of recreational sites and resources</td>
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</table>

Sustainability Levels

A total sustainability score for a project is obtained by combining the individual scores of each sustainable practice utilized or incorporated in the project. The total score represents the overall degree or level of project sustainability that has been achieved for the project. Achievement levels or targets are as follows:

- **Leho (Cory Shell)** 15 points
  Minimum (Mandatory) Level of Sustainability
  A combination of sustainable practices and guidelines that achieves a total score of 15 points is easily attainable and considered compulsory for most projects. Many of the high scoring Pono-Premium Practices that can be implemented to reach the Leho target are standard practices and work items that are already required or recommended by HDOT and other agencies for highway projects.

- **Koa (Mahogany Tree)** 16-28 points
  Moderate Level of Sustainability
  A combination of practices that achieves a total score of 16 to 28 points indicates that consideration has been given to implementing more than just the bare minimum of sustainable practices. Ideally, all or most of the Pono-Premium and a fair number of the Pono-Preferred Practices are incorporated into the project to reach the broad canopy of benefits reflected by this scoring level.

- **‘Oo (Hawaiian Hawk)** 29-42 points
  High Level of Sustainability
  A score of 29 or more points reflects a concerted effort to integrate a wide range of sustainable practices into the project. Scores approaching 40 points indicate the project has achieved a high-soaring level of environmental and social harmony.

FIGURE 14 A rating system of sustainable practices is offered to measure a project’s degree of Pono-ness.
USING THE MASTER PLAN: HOW, WHEN, WHY & WHO

Each year HDOT carries out dozens of highway projects of different types and scales, at various locations, and in various stages of development. The Master Plan and associated Roadside Design Guide are to be referenced and used for all types of highway projects – large and small – in any location, and throughout HDOT’s project delivery process from initial planning to construction. The material is illustrative and succinct and intended primarily for highway engineers, but it can also be of value for other planning and design professions, state and local officials, community groups, environmental organizations and basically anyone with an interest or stake in highway projects. Based on a project’s location, a Master Plan user simply refers to plan maps to determine the highway corridor type for which sustainable best practices and recommendations are then provided.

The Master Plan draws upon current, state-of-the-art empirical data on sustainability policy, planning, and practices without rehashing tedious proofs, examples, and performance metrics. Not to be simply taken at its word, the plan references other state and local initiatives and manuals that promote sustainability with regard to issues of storm-water treatment, multi-modal (ped, bike, transit) travel, invasive plant control, shoreline stabilization, wildlife protection, pesticide use, stream and wetland restoration and preservation, and energy consumption. Users of the Master Plan will thus find consistency and corroboration among a whole host of local and national documents on sustainability programs and practices.

Although the Master Plan and Roadside Design Guide are “how-to” manuals covering a number of highway design issues and topics, the documents are not technical design manuals in the strict sense of the term. The Master Plan and Design Guide provide little in the way of hard design criteria such as sizes, distances, and rates, nor are methods provided for determining this data. (The reason for this limitation is two-fold: first, it was beyond the scope of the project to develop this data, and second this data and criteria can be found in other manuals on sustainability design and best practices.) The primary purpose of the Master Plan and Design Guide is to give users a collection of empirically validated sustainable options to the design and treatment of roadsides and roadside elements. The documents are intended to be informative and instructive, but not didactic or absolute – there are no “standards” or compulsory techniques and outcomes presented here. The Master Plan and Design Guide are simply a way of showing people how to go about making highways more contextual and sustainable, and why this is important.

CONCLUSION

For those of us who visit Hawaii for vacations and holidays, we can often find ourselves in places that have many of the trappings of the mainland but with a dramatically different landscape backdrop in a great climate. If we expect all the creature-comforts of home, including roads and highways to every remote corner, the people of Hawaii may be happy to accommodate us in an economy based on tourism and tourist satisfaction. If on the other hand we place more value on the Islands’ clean waters, unique native flora, unscarred mountainsides, quaint towns, and lovely beaches, then we have to let the locals know we appreciate what they value too. The State of Hawaii will be improving and building roads and highways long into the future, and roads will continue to have major implications for the Island’s social and environmental well being. Visitors and locals alike must advocate for not only safe roads but for healthy and sustainable roads if Hawaii is to remain the island paradise we all cherish.

AUTHOR BIO

Charlie Scott is a registered Landscape Architect with Jones & Jones Architects and Landscape Architects in Seattle, WA. Charlie has over twenty five years of experience in the planning and design of transportation facilities that require careful integration into sensitive landscapes. Award-winning projects include the design of the Paris-Lexington Road (Paris Pike) in Kentucky, recognized as a benchmark CSS project, and the design for the reconstruction of U.S. Highway 93 in western Montana, celebrated as “America’s Wildlife Highway”.