CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENADA

SITE SUITABILITY STUDY
+ CONCEPT MASTER PLAN
+ SUSTAINABILITY STUDY

URBANIZA
WWW.KOBIKARP.COM
TABLE OF CONTENTS

3. SITE SUITABILITY STUDY
4. TABLE OF CONTENTS
5. INITIAL ANTICIPATED PROJECT VISION
6. LOCATION MAPS - REGIONAL
7. LOCATION MAPS - LOCAL
8. SITE INVENTORY AND ANALYSIS
9. NOTABLE SITE FEATURES
10. OTHER NOTABLE SITE FEATURES
11. LAND SIDE PROJECT COMPONENTS
12. CARGO PORT FACILITIES
13. FREE TRADE ZONE FACILITIES
14. TOURIST AND CRUISE FACILITIES
15. WATER SIDE PROJECT COMPONENTS
16. SITE SUITABILITY SUMMARY
17. THE FUTURE OF DEVELOPMENT ON CARRIACOU
18. CARRIACOU - SENSE OF PLACE
19. INTRODUCTION
20. LOCATION MAP
21. EXISTING CONDITIONS
22. SITE PLAN
23. LAND USE PLAN
24. PORT AND FACILITIES PLAN
25. RETAIL & BUSINESS HOTEL PLAN
26. VEHICULAR CIRCULATION DIAGRAM
27. GREEN BELT DIAGRAM
28. BUILDING INFORMATION: WAREHOUSE
29. BUILDING INFORMATION: BUSINESS HOTEL
30. BUILDING INFORMATION: RETAIL CENTER
31. BUILDING INFORMATION: WORLD TRADE CENTER
32. AERIAL FROM THE SOUTH
33. AERIAL FROM THE WEST
34. RETAIL CENTER VIGNETTE
35. WORLD TRADE CENTER VIGNETTE
36. WATER VIEW VIGNETTE
37. SUSTAINABILITY
38. URBAN PLANNING
39. TRANSECT
40. TRANSECT VIGNETTES
41. PUBLIC & PRIVATE FRONTAGES
42. THOROUGHGHFARE STANDARDS
43. THOROUGHFARE ASSEMBLIES
44. VEHICULAR ASSEMBLIES & DIMENSIONS
45. BUILDING DISPOSITION
46. BUILDING FUNCTION
47. PUBLIC PLANTING & LIGHTING
48. PUBLIC SPACES
49. PRINCIPLES OF URBANISM
50. BENEFITS OF URBANISM
51. SUSTAINABLE & RENEWABLE ENERGY
52. SOLAR POWER
53. BIOMASS
54. WAVE POWER
55. WIND POWER
56. GEO THERMAL POWER
57. HYDROPOWER
58. CONSERVATION
59. HABITAT RESTORATION & CREATION
60. LAND PROTECTION & RESTORATION
61. STORM WATER MANAGEMENT
62. WASTE WATER MANAGEMENT
63. RECYCLING & RECLAIMED MATERIALS
64. LIGHT POLLUTION REDUCTION
65. ADAPTIVE USE
66. HEAT ISLAND REDUCTION
67. PASSIVE & ACTIVE SUSTAINABLE SYSTEMS
68. ENERGY EFFICIENT NEIGHBORHOODS
69. WATER CONSERVATION
70. URBAN SPRAWL
71. TRANSIT ORIENTED DEVELOPMENT
72. BICYCLE FRIENDLY ENVIRONMENT
73. EFFICIENT TRANSPORTATION
74. DIVERSE COMMUNITIES
75. COMMUNITY CONNECTIVITY
76. AUTOMOBILE DEPENDENCY REDUCTION
77. PUBLIC URBAN SPACES
78. WALKABLE ENVIRONMENTS
79. WALKABLE ENVIRONMENTS
80. WALKABLE ENVIRONMENTS
81. LOCAL ECONOMIES
82. ENERGY EFFICIENCY
83. POLLUTION REDUCTION
84. CULTURAL PRESERVATION & RESTORATION

CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENADA
Carriacou Free Port
Dumfries, Carriacou, Grenada

Site Suitability Study
Presentation Date
June 22, 2010

prepared for:

URBANIZA

prepared by:

ECOPLAN
ECOLOGICAL/ENVIRONMENTAL LAND PLANNING
LANDSCAPE ARCHITECTURE, LAND USE ANALYSIS
1515 NE 4 AVENUE, FORT LAUDERDALE, FL, 33304
(954) 524-3722 FAX (954) 524-1529 www.ecoplan-inc.com

Brandy Marine International, LLC
Table of Contents

3 Project Vision

4-5 Location Maps
- Proximity Map - Brazil and Grenada
- Proximity Map - Windward Islands, Grenada and Carriacou
- Site Location Map - Carriacou, Grenada
- Site Aerial Map - Crown Lands at Dumfries, Carriacou

6-11 Site Inventory and Analysis
- Site Description
- Site Description (Continued)
- Site Description - Lime Factory Photos
- Site Description - Historic Cemetery Photos
- Site Description - Other Notable Site Features
- Site Description - Various Site Feature Photos

12-15 Land Side Project Components
- Project Components - Land Side
- Cargo Port Facilities Area
- Free Trade Zone Facilities Area
- Tourist and Cruise Facilities Area

15-20 Water Side Project Components
- Initial Areas of Consideration
- Navigational Considerations - Great Breteche Bay
- Navigational Considerations - Great Breteche Bay (Continued)
- Harbor Configuration
- Conclusion - Water Side Project Components

21 Site Suitability Summary

22-33 Beyond the Free Port Project -
Planning for the Future Development Opportunities throughout Carriacou
Initial Anticipated Project Vision

We anticipate that the initial vision for the project seeks to establish the following elements:

- A DUTY FREE ZONE on the island of Carriacou, Grenada
- New Port Facilities to serve Handy Size Bulk Carriers and Cruise Ships
- The most accessible Free Port in the Caribbean basin, with easy access between Caribbean and South American markets
- Free Port facilities for storage, showcasing and assembly of products of Brazilian and other origins, for shipping worldwide
- CRUISE SHIP docking and terminal facilities on the Island of Carriacou
- TOURISM, RESORT and ENTERTAINMENT facilities, with access to a DUTY FREE SHOPPING MALL, for VISITORS
- A new economy for the Island of Carriacou via job creation and secondary development
- A network of services and amenities for employees of the Free Port
Carriacou Free Port
Dumfries, Carriacou, Grenada

Site Location Map - Carriacou, Grenada

Site Aerial - Crown Lands at Dumfries, Carriacou
Site Description

- The proposed project site lies along the southern portion of the island of Carriacou, near the village of Dumfries.
- The proposed waterside port facilities would be located in Great Breteche Bay, immediately adjacent and south of the Dumfries Crown Lands.
- According to survey maps furnished by the Minister of Carriacou and Petite Martinique, there are approximately 310 acres of "Crown Land" available. However, not all of this land may be suitable for use for the free port facilities project.
  - Approximately 221 of the 310 acres appear to have suitable slope conditions and therefore are suitable for development.
  - Approximately 89 of the 310 acres lie along a steep hillside with a relatively dense Caribbean coastal forest and therefore is not suitable for development.
  - Approximately 25% of the 221 usable acres is a tree covered, limited density forest with limited ecological value, and is suitable for development.
  - Approximately 75% of the 221 usable acres is open and disturbed pasture and scrub lands and is suitable for development.

Carriacou Free Port
Dumfries, Carriacou, Grenada
Site Description (Continued)

- The project site contains a number of significant historical features that could be integrated with the proposed tourism portion of the development. These features include the following:
  - An early 20th century lime factory that is in excellent condition and would be suitable for renovation and conversion to a historic interpretive center about the industrial history of the island of Carriacou.
  - Housing and dormitories related to the lime factory.
  - Well head structures previously used for potable water supply for the lime factory.
  - An abandoned cemetery with tombstones dating back to the early to mid 1800's.

- These elements are all located near the middle portion of the site, and therefore bisect the site. This may create a division between the industrial and tourism facilities proposed for the project.

- These elements could be restored and combined to create a historical interpretation center for tourism based activities for visiting cruise ship passengers.

---

Carriacou Free Port
Dumfries, Carriacou, Grenada

Site Inventory and Analysis
Site Description - Lime Factory Photos

Carriacou Free Port
Dumfries, Carriacou, Grenada

Site Inventory and Analysis
Site Description - Historic Cemetery

Carriacou Free Port
Dumfries, Carriacou, Grenada

Site Inventory and Analysis
Site Description - Other Notable Site Features

- In addition to the Open Scrub Pasture Lands and Forest Areas, the site has a number of other notable site features:
  - A rock and gravel quarry near the Northwest corner of the property
  - A historic freshwater well head located along the seasonal stream corridor
  - A seasonal drainage stream and wetland that bisects the site from north to south. This stream may only flow during and immediately after seasonal storm events. Otherwise it appears to stay dry for the majority of the year.
  - A wetland area near the “beach terminus” of the seasonal stream with coastal wetland plant species such as upland mangroves, buttonwood, etc.
  - A “brown sand” beach at the “mouth” of the seasonal stream. This beach will require enlargement and visual enhancement if it is going to be used for tourism purposes.
  - Low cliffs up to 50’ high along the southeastern shoreline. These will have to be brought down to the proper elevation to function with the cargo port and harbor functions.
  - A “rock hill” located at the very southeast corner of the property. The material in this hill may be suitable for use in the construction of a breakwater structure.

---

Map of Additional Site Features

Carriacou Free Port
Dumfries, Carriacou, Grenada

Site Inventory and Analysis
Site Description - Various Site Features

Beach Zone looking southwest to the Cay Islands
Beach Zone looking east to the low cliffs
Seasonal wetland zone behind beach
Low cliffs along southeastern shoreline

Rock Hill - Possible source for breakwater material
“Rock Hill” looking southeast
“Testing” possible rock samples at “Rock Hill”
Typical open scrub and open pasture lands

Carriacou Free Port
Dumfries, Carriacou, Grenada

Site Inventory and Analysis
Project Components - Land Side

- In order to satisfy the project vision as described on page 3 of this report, the property will need to be divided into 4 major project components. These components include both Land Side Operations and Water Side Operations. The components are:

  - Cargo and Port Operations Facility
  - Free Trade Zone Facilities
  - Tourist and Cruise Facilities Zone
  - Water Side Harbor Facilities

- The Harbor Facilities, Cargo and Port Operations and Free Trade Zone will have the need to function as an interconnected industrial operation. Each may require separate management and operations, but the connectivity between each of the zones will be critical in managing the cycle of goods from importation, to assembly, to showcasing and exportation.

- The Tourist and Cruise Facilities Zone, is only integrated with the Cruise Ship portion of the Harbor Facilities. The tourist zone involves the processing and entertainment of people, and therefore is in conflict with the more industrial portions of the project.

  - All of the industrial facilities must be properly buffered and screened from the tourist facilities.
  - The tourist zone is oversized to accommodate proper buffering of the industrial areas.
  - Other practices will be required to further separate the tourist zone from the industrial zone.

Carriacou Free Port

Dumfries, Carriacou, Grenada

Land Side Project Components
Cargo Port Facilities Area

- Approximately 33 Acres of land may be available to set aside for cargo processing, holding, loading and unloading, as well as “Roll On / Roll Off” type facilities. This area would include a “fill” area out into the bay, of approximately 10 acres with 1700’ of bulkhead frontage that accommodate up to 3 “Handy Size” bulk carriers of approximately 500’ in length.

- The land side portion of the proposed Port Zone is at a higher grade, and will require some cutting and excavating in order to make a level cargo zone. The transition zone from land to water currently exists as a cliff, that is approximately 30-50 feet above sea level. In general, this zone will most likely require that land be excavated from the eastern and south eastern portion of this zone, and deposited or filled along the western portion of the zone, as well as in the water side fill area behind the bulkhead.

- Although there is additional Crown Land available to the east of this port zone, that area is on a hillside and has slopes that are too severe for port facility development. Additionally, this area contains a forest reserve that would act as a suitable buffer between the port facilities and the neighboring properties to the east.

- The scale of this zone is very similar to the port facilities at Crown Bay, St. John’s, U.S.V.I. An aerial map inserted at the same scale has been overlaid to show the similarities.

- This zone will require separation from the Tourist and Cruise Facilities Zone and integration with the Free Trade Zone Facilities.
Free Trade Zone Facilities Area

- There are approximately 106 acres of Crown Land available for the Free Trade Zone. This area could include up to (30) 2.5 acre parcels, each with 50,000 square foot manufacturing facility or if larger parcels are required, up to (10) 8 acre parcels, each with a 150,000 square foot manufacturing facility.

- The Free Trade Zone can accommodate manufacturing facilities, showrooms and a Duty Free Shopping area, only accessible to Cruise Ship passengers.

- The Free Trade Zone will require an integrated connection with the Cargo, Port and Harbor Facilities. The only connection with the Tourist and Cruise Facilities Zone will be through a possible Duty Free Shopping area.

- Because of the industrial nature of the Free Trade Zone Facilities and because of the conflicting nature of the Tourist and Cruise Facilities, this zone must be properly separated and buffered to minimize any negative impact on the Tourist Zone.

- The interpretive historic areas (cemetery and lime factory), are nearly surrounded by the Free Trade Zone Areas and therefore will require additional buffering because of the potential impact on this important tourism zone.

Carriacou Free Port
Dumfries, Carriacou, Grenada

Land Side Project Components
Tourist and Cruise Facilities Zone

- The Tourist and Cruise Facilities are Resort Facilities, and require the same level of aesthetic treatment as any world class resort destination elsewhere in the Caribbean.
  - Inherent conflicts exist as the tourism zone is immediately adjacent to an industrial zone (Cargo, Free Trade Zone, etc.).
  - Adequate separation and buffering of conflicting uses is EXTREMELY critical to the success of the tourist zone. This buffering and separation may be accomplished by:
    - Large masses of vegetation
    - Solid walls at the boundaries
    - Compatibility of the architecture to minimize impact on the tourist zone
    - Creative use of grading to create vertical/visual separation
    - Place the cruise ship pier in the proper location and at the proper angle to block the cargo and harbor facilities. Tourists will only be present when Cruise ships are in port, and the ships will be partially blocking unfavorable views.
    - Orient all views in the resort area towards the west and southwest, away from the industrial areas. Place back of house portions of the resort area towards the east when possible.

- The only existing beach is substandard by resort standards when compared to others in the Caribbean. Also, this beach will be partially blocked by the harbor facilities.
  - A new beach will have to be created along the southwestern shore using imported sand and offshore underwater structures to help capture and maintain the beach.

Eastern portion of proposed beach.  Proposed ‘new’ beach area and view  Proposed view orientation to southwest

Carriacou Free Port
Dumfries, Carriacou, Grenada

Land Side Project Components
Initial Areas of Consideration

Four areas were visited by land and by water

- **Tyrrel Bay**
  - Already a marina/mooring deep water lagoon
  - Stabilized water conditions
  - Land side marina component being privately developed
  - No Crown land available or contribution for port activity
  - Not enough private land to attempt a trade or purchase for land side component

- **Hillsborough Bay**
  - Arrival Bay for Carriacou
  - Location of the main town; Hillsborough
  - Location of existing Carriacou Port and ferry arrival dock
  - Deep and fairly protected water
  - No sufficient Crown or private land close enough to facilitate port features

- **Little Breteche Bay**
  - This was presented by officials as the preferable location for Port
  - Crown land minimal relationship to water
  - Public road adjacent to water
  - Several private parcels would have to be bought/traded to facilitate port needs
  - Bay is very unprotected, requiring substantial wave breaking structures
  - Bay is extremely shallow relative to other locations requiring substantial dredging to make usable

- **Great Breteche/Salazan Bay**
  - Of all sites visited and/or considered, team felt this had the best possibilities
  - Sufficient Crown land surrounding water to facilitate rapid development plan
  - As stated earlier, land features provide some relatively level access points for port loading and unloading
  - Bay is semi protected by existing islands including Saline, White, Dry Rock, Frigate and Cassada Rocks but will require additional wave break structures
  - Water access would be from the West and open sea however approach to the proposed Port entrance would be sheltered by Saline Reef providing a safer navigable channel into a port harbor

---

**Carriacou Free Port**
Dumfries, Carriacou, Grenada
Navigational Considerations - Great Breteche Bay

- Prevailing wind and wave activity comes from the North and East to the island of Carriacou.
- Great Breteche Bay and Salazan Bay are both names used on navigational charts to define the water area adjacent to the land site description.
- Area is on the South end of the island thus sheltered from northern storm/wave/surge.
- Bay is not sufficiently protected from the East.
- Heavy seas/deep water surge and related energy must be sheltered with a structure (Breakwater) that must run from the seabed to the surface given the fact deep water waves are oscillating in form.
- Wind-only driven waves can be arrested typically with a floating wave attenuator structure.
- To safely enter the Harbor as proposed, a north-south-west breakwater will have to be constructed southward from the eastern terminus of Crown land south of Dumfries and be built in a South to South west and then West configuration to accomplish:
  - Protection from Eastern deep water energy seas
  - To follow the existing reef line
  - To correctly line up the harbor entrance with the selected approach inside the Saline Reef
- Trade winds from the South appear to be sufficiently stopped by the islands mentioned above.
- Westerly winds, which would be abaft of an entering vessel would likely cause some waves inside the harbor so it would be proposed that a floating wave attenuator be installed on the western side of the Port harbor protecting ships inside from those waves.
- Design of approach and interior of the harbor needs a controlling depth of thirty five feet (35'). Between a combination of the various types of vessels that are proposed to use this facility, vessel drafts vary between 18' and 28'.
- Vessel operators and their insurance companies require a cushion of space below the lowest part of the vessel to allow for extreme tide and/or storm conditions which may make water shallower, especially with wave activity.

Carriacou Free Port
Dumfries, Carriacou, Grenada

Water Side Project Components
Navigational Considerations (continued)

- To be further confirmed, depths on the approach between Saline Reef and the southern edge of Great Breteche Bay appear to have sufficient draft up to the designed harbor entrance.

- Dredging will be required. It is thought that the outer side of the entrance breakwater could be constructed on the shallow edge of the line between the sea and the Bay, providing a cost consideration for building a long breakwater in shallower rather than deeper water. Inside the breakwater, the harbor would have to be dredged to the controlling depth.

- Approximate quantity of dredging is estimated at 3,645,305 cubic yards to maintain a working depth of 35'

- Cost of said removal will be based on:
  - Geotechnical analysis of material will have to be determined through core samples of the seabed through an average of 12' to 29' of required dredge depth below the seabed
  - Use of material on property or spoil site to dispose
  - Material can be used for shoreline/bulkhead stabilization
  - Material may be used for a portion of the breakwater
  - Dredge material often times is merely pumped to open sea depending on permit availability

- Preliminary estimates show a breakwater of approximately four thousand feet (4,000 ft.).

- Breakwaters are usually designed on a 3:1 slope formula, meaning the base on the seabed would be three times wider than the protruding above water level portion.

- Site team extracted three rock samples brought back to be tested for integrity of local rock as a potential breakwater material. Local supply of material will have a dramatic effect on lowering the cost of this portion of the harbor. It may be possible to take some of the high lands, if rock is sufficient, and merely transfer the rock by short ride directly onto a breakwater design. There is also a quarry on Crown land where one of the sample rocks was extracted.
Harbor Configuration

- Once inside the harbor and with consistent depth, further design following the land plan segment earlier, will include a ship turning basin of 1,500 feet, allowing for maneuvering at three times the length of the longest ship using the port.
- Port use and cruise/passenger uses are dramatically different.
- Ports are noisy and "industrial".
- Cruise areas are passive and recreational.
- Land/water zipper edge segregates the two uses accordingly.
- Design includes using the dockage of an arrived cruise ship to partially/ completely visually block the sight of the port operations.
- Phasing can be accomplished. First phase will have all of the entrance channel and at least two thirds of the harbor prepared.
- Additional cruise and port docks can be expanded in a second or third phase as can the uplands area in relationship to water arrival needs.
- A further study area looked at the addition of a recreational marina component. If such a component were added, it would be located south of the cruise terminal and may require additional harbor expansion.
Items of Future Consideration

- **Next Steps**
  - Meeting with client regarding findings report
  - Assuming acceptance of findings;
  - Second on-site meetings
    - Port development officials from Brazil
    - Grenada government officials
    - Charette on preliminary plans and refinement

- **Commissioning of further studies**
  - Bathymetric validation of all entrance and harbor water depths per static base tidal datum
  - Geotechnical evaluation of site (land and water) with respect to seabed, land based and shoreline foundation structure elements and to necessary depths
  - Wind and wave engineering study with regard to modeling harbor wave break features
  - Breakwater preliminary design and wave attenuator costing relative to wind and wave study
  - Secondary level design of port and cruise harbor facilities based upon above conditions.

---

Carriacou Free Port
Dumfries, Carriacou, Grenada

Water Side Project Components

![Proposed Harbor Location - Great Breteche Bay Looking North](image)

![Proposed Harbor Location - Great Breteche Bay Looking Northwest](image)
Site Suitability Summary

Based on the information gathered and assembled in the Initial Site Suitability Study, the team of EcoPlan and Brand Marine International have determined the following:

- The proposed project area, described as the Crown Lands near Dumfries and Great Breteche Bay, appear to be suitable for the development of:
  - Cargo and Port Operations Facilities
  - Free Trade Zone Facilities
  - Tourist and Cruise Facilities Zone
  - Water Side Harbor Facilities

- The financial feasibility of developing these facilities is above and beyond the scope of this study and must be determined in a future, separate study.

- Based on the survey information furnished by the office of the Minister of Carriacou and Petite Martinique, there appears to be a total of approximately 310 acres of Crown Land available for development.
  - Based on the spatial demands of the various components, related compatibility issues and the area of land that is suitable for development, we have determined that approximately 221 acres should be set aside for the development.

- Based on the criteria mentioned in this report, a proposed zoning plan for the various project components has been determined (see page 12).

- Site excavating and filling will be required to level terraces throughout of the Cargo Port Zone and Free Trade Zone. The extent of this earthwork is significant and should be studied further when determining the financial feasibility of the project. More detailed survey and geotechnical information will be required.

- An extensive dredging operation will need to take place in order to satisfy the requirements of the Water Side Harbor Facilities. The extent of this operation is significant and should be studied further when determining the financial feasibility of the project. More detailed bathymetric and geotechnical studies will be required.

- Due to the exposed nature of the proposed harbor facilities, a breakwater and wave attenuator structure will be required.
Beyond the Free Port Project -
Planning for the Future Development Opportunities throughout Carriacou

- The Free Port project may prove to be a significant economic engine that catalyzes future tourism, business and municipal development throughout the island.

- Potential opportunities in new tourism development in Carriacou could include the following:
  - Eco-resorts
  - Boutique Hotels
  - Real Estate and Second Home Development
  - Boutique Retail and Entertainment
    - Focused on “sense of place” and “local flavor”
    - Fine goods from small scale international franchises
    - Unique offerings of foreign goods from Brazil and other locations
  - Eco Tourism, Parks and Recreation
  - Internationally recognized festivals
  - Quality marina(s) designed to international standards to increase yacht visitation.

- New tourism based developments should set a new standard in creating a fresh “sense of place” that is uniquely Carriacouan, to differentiate the island from other offerings across the Caribbean.
  - Highlight the landscape, flora and fauna of the island
  - Implement an architectural style that is uniquely Carriacouan. This style may be a blend of contemporary Caribbean design with the use of modern and sustainable materials and features.
    - Create an ecological design style that cross references the application of modern technology with native, local materials and design elements.
    - Create a style that blends African and Caribbean history to highlight the beginning of civilization in the Caribbean.
    - Blend contemporary architecture with modern technological materials to relate to Afro/Caribbean/Earth elements already seen throughout Carriacou.
In the development a new and refined “sense of place” for Carriacou, design should reflect upon the history of the island, its landscape, its colors and its people for inspiration for a new style that is unique to Carriacou and helps differentiate it from the rest of the Caribbean.
In the development a new and refined “sense of place” for Carriacou, design should reflect upon the history of the island, its landscape, its colors and its people for inspiration for a new style that is unique to Carriacou and helps differentiate it from the rest of the Caribbean.

Carriacou Free Port
Dumfries, Carriacou, Grenada

Carriacou - Sense of Place
Approximately 13 square miles, Carriacou Island is the largest island of the Grenadines. The hilly terrain, white sand beaches, harbors, and natural beauty make this site an ideal location for a duty free zone and tourist destination. Located near the village of Dumfries, on the Great Breteche Bay, the site is approximately 310 acres. The 5 major project components are:

- Cargo and Port Operations Facilities
- Free Trade Zone Facilities
- Tourist and Cruise Facilities Zone
- Water Side Harbor Facilities
- Significant historical features including an early 20th century lime factory, housing and dormitories, wellhead, and other archeological sites

Carriacou Free Port’s strategic location makes it the most accessible free port in the Caribbean Basin. Acting as the gateway to South America, it creates a network of services, business opportunities, and amenities. For employees, Carriacou Free Port creates new economies for the Island of Carriacou via job creation and secondary development.

The site plan arrangement integrates the highest sustainable concepts and methods while maintaining sensitivity to the surrounding ecosystem. The duty free retail zone interweaves the buildings into the landscape by integrating the natural topography and organic building forms into a singular vision. Tourists and business travelers have direct access to the duty free shopping mall. The warehouse district includes new port facilities and supporting buildings for the storage, production, and sale of goods. This unique concept simultaneously promotes a pedestrian friendly environment and economic stimulation.
BUILDING CONFIGURATION
1. Building height shall be measured in number of Stories, excluding Attics and required setbacks.
2. A maximum of 25 ft (7.6 m) from the finished floor to the roof shall be permitted.
3. Height shall be measured to the eave or roof deck.

SETBACKS - PRINCIPAL BLDG
1. The Facade and Elevations of Principal Buildings shall be determined from the Lot lines as shown.
2. Facade shall be set back from the Principal Frontage to the minimum specified width in the table.

BUILDING INFORMATION: WAREHOUSE

BUILDING INFORMATION: WAREHOUSE

CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENAEDA

WWW.KOBKARP.COM
I. BUILDING FUNCTION
   Residential: Not permitted
   Lodging: Open
   Office: Limited use
   Retail: Limited use

II. BUILDING CONFIGURATION
   Principal Building: 3 stories max. 2 sl.
   Outbuilding: 2 stories max.

III. LOT OCCUPATION
   Lot Width: Open
   Lot Coverage: 20% max.

IV. BUILDING DISPOSITION
   Edgeward: Open
   Sideward: Open
   Rearward: Open
   Checkward: Open

V. SETBACKS - PRINCIPAL BUILDING
   (a) Front Setback Principal: 10 ft. max.
   (b) Exposed Roof Principal: 12 ft. max.
   (c) Side Setback Principal: 9 ft. max.
   (d) Rear Setback Principal: 6 ft. max.
   (e) Roof Overhang Principal: 3 ft. max.

VI. SETBACKS - OUTBUILDING
   (a) Front Setback Outbuilding: Not permitted
   (b) Side Setback Outbuilding: Not permitted
   (c) Rear Setback Outbuilding: Not permitted

VII. PRIVATE FRONTAGES
   Common Lawn: Limited
   Porch & Fence: Limited
   Verandah or L.C.: Limited
   Fences: Limited
   Steps: Not permitted
   Stoop & Awning: Limited
   Gallery: Limited
   Arcade: Limited

PARKING PROVISIONS
   * 15 ft. from center line of alley
   * 60 ft. from any lot lines shown, up to the maximum. Refer to matrix for exact parameters and minimums

BUILDING CONFIGURATION
1. Building height shall be measured from centerline of street, exclusive of attic and roofed basements.
2. Stories may not exceed 14 feet in height from finished floor of first building except for a first floor commercial tenant which must be in accordance with町 11.5 with a maximum of 25.5 ft.
3. Height shall be measured to the eave of roof deck

SETBACKS - PRINCIPAL BUILDING
1. The facade and elevation of Principal Buildings shall be designed from the Lot lines as shown.
2. Facade shall be built along the principal facades to the maximum specified in the table.

SETBACKS - OUTBUILDING
1. The facade of the Outbuilding shall be derived from the Lot lines as shown.

PARKING REQUIREMENTS
1. Uncovered parking spaces may be provided within the third layer as shown in the diagram.
2. Covered parking shall be provided within the third layer as shown in the diagram.
3. Trash containers shall be stored within the third layer.

BUILDING INFORMATION: BUSINESS HOTEL

CARRICAOU FREE PORT
DUMFRIES, CARRICAOU, GRENADA
CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENADA
CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENADA

SUSTAINABILITY STUDY

URBANIZA

WWW.KOBIKARP.COM
The way we grow—especially how and where we grow—will have a profound effect on our planet and on us. Land use and neighborhood design patterns create a particular physical reality and compel behaviors that have a significant effect on the environmental performance of a given place. Segregated land uses accessed by highspeed roadways that necessitate the use of cars have been the predominant development pattern over the past 50 years. Burning fossil fuels for transportation increases air pollution and related respiratory diseases. Automobile-oriented neighborhoods tend to be hostile to pedestrians and unsupportive of traditional mixed-use neighborhood centers. Sprawling development patterns fragment habitat, endanger sensitive land and water bodies, destroy precious farmland, and increase the burden on municipal infrastructure.

In contrast, by placing residences and jobs proximate to each other, thoughtful neighborhood planning and development can limit automobile trips and the associated greenhouse gas emissions. Mixed-use development and walkable streets encourage walking, bicycling, and public transportation for daily errands and commuting. Environmentally responsible buildings and infrastructure are an important component of any green neighborhood, further reducing greenhouse gas emissions by decreasing energy consumption. Green buildings and infrastructure also lessen negative consequences for water resources, air quality, and natural resource consumption.

Green neighborhood developments are beneficial to the community and the individual as well as the environment. The character of a neighborhood, including its streets, homes, workplaces, shops, and public spaces, significantly affects the quality of life. Green neighborhood developments enable a wide variety of residents to be part of the community by including housing of varying types and price ranges. Green developments respect historical resources and the existing community fabric; they preserve open space and encourage access to parks. Green buildings, community gardens, and streets and public spaces that encourage physical activity are beneficial for public health. Combine the substantial environmental and social benefits and the case for green neighborhoods makes itself.
The rural-to-urban transect is divided into six transect zones (T-zones) for application on zoning maps. These six habitats vary by the level and intensity of their physical and social character, providing immersive contexts from rural to urban. These elements are coordinated by these T-zones at all scales of planning, from the region through the community scale down to the individual lot and building.

The transect is evident in two ways. Zones and communities (1) exist as characteristic places on the transect and (2) they evolve along the transect over time. As places, the six transect zones display identifiable characteristics, based on normative American urban patterns. They also increase in complexity, density and intensity over a period of years, until a “climax condition” is reached. This is a growth process analogous to succession in natural environments.

This approach to urban planning provides a holistic integration of the project components. Methods of environmental protection, open space conservation and water quality control. The scale of planning concern from the regional through the community scale, on down to the individual lot and, if desired, its architectural elements. It provides a set of zoning categories common to new communities and to the infill of existing urbanized areas. It is compatible with architectural, environmental, signage, lighting, hazard mitigation, and visitability standards. It generally increases the range of the options over those allowed by conventional zoning codes.

The transect, as a framework, identifies a range of habitats from the most natural to the most urban. Its continuum, when subdivided, lends itself to the creation of zoning categories. These categories include standards that encourage diversity similar to that of organically evolved settlements. The standards overlap (they are parametric), reflecting the successional ecotones of natural and human communities. The transect thereby integrates environmental and zoning methodologies, enabling environmentalists to assess the design of social habitats and urbanists to support the viability of natural ones.
One of the principles of Transect-based planning is that certain forms and elements belong in certain environments. For example, an apartment building belongs in a more urban setting, a ranch house in a more rural setting. Some types of thoroughfares are urban in character, and some are rural. A deep suburban setback destroys the spatial enclosure of an urban street; it is out of context. These distinctions and rules don’t limit choices; they expand them. This is the antidote for the one-size-fits-all development of today.

The best urbanism requires the sequential influence of many participants. A code allows buildings to be designed and built by many hands over years, or even generations. The single designer or committee leads to a lack of robustness, similar to vulnerable monocultures in nature. A parametric and successional code allows experience to feed back and become integrated — the fourth dimension of time. Once adopted, it stays in place, allowing urbanism to evolve and mature without losing its necessary foundation of order.

It also ensures that a community will not have to scrutinize all proposed projects, because the intentions of the citizens will have already been determined in the process that leads to the code.
TABLE 2: Sector/Community Allocation. Table 2 defines the geography, including both natural and infrastructure elements, determining areas that are or are not suitable for development. Specific Community types of various intensities are allowable in specific Sectors. This table also allocates the proportions of Transect Zones within each Community Type.

A. Regional Scale:
“Sector” is a neutral term for a geographic area. Six Sectors establish the locations where certain patterns of development are allowed. This system addresses preservation and development at the Regional scale. The Sectors are assigned as follows:

- O-1 Preserved Open Sector and O-2 Reserved Open Sector for protection of open lands
- G-1 Restricted Growth Sector, G-2 Controlled Growth Sector, and G-3 Intended Growth Sector for New Communities
- G-4 Infill Growth Sector for managed growth of existing urbanized areas

B. Community Scale:
The Regional Sectors each contain one or more of the three basic Community Unit types (CLD, TND, RCD).

- CLD - Clustered Land Development (Hamlet, settlement, cluster) permitted in Growth Sectors G1, G2
- TND - Traditional Neighborhood Development (Village, neighborhood) – permitted in Growth Sectors G2, G3, G4
- RCD - Regional Center Development (Regional Center, town center, downtown) – permitted in Growth Sectors G3, G4

C. Transect Zones:
The Transect, as a framework, identifies a range of habitats from the most natural to the most urban. Its continuum, when subdivided, lends itself to the creation of zoning categories. These categories include standards that encourage diversity similar to that of organically evolved settlements. The standards overlap (they are parametric), reflecting the successional ecotones of natural and human communities. The Transect thereby integrates environmental and zoning methodologies, enabling environmentalists to assess the design of social habitats and urbanists to support the viability of natural ones.
Progress Set

TABLE 1: Transect Zone Descriptions. This table provides descriptions of the character of each Transect Zone.

<table>
<thead>
<tr>
<th>Transect Zone</th>
<th>Character</th>
<th>Placement</th>
<th>Frontage Types</th>
<th>Height</th>
<th>Civic Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1 NATURAL</td>
<td>Natural landscape with some agricultural use</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Parks, Greenways</td>
<td></td>
</tr>
<tr>
<td>T-2 RURAL</td>
<td>Primarily agricultural with woodland and scattered buildings</td>
<td>Variable</td>
<td>1-2-story</td>
<td>Parks, Greenways</td>
<td></td>
</tr>
<tr>
<td>T-3 SUB-URBAN</td>
<td>Low-density residential areas, adjacent to higher zones that some mixed use</td>
<td>Single-family houses, pedestrians occasionally</td>
<td>1-2-story with some 3-story</td>
<td>Parks, Greenways</td>
<td></td>
</tr>
<tr>
<td>T-4 GENERAL URBAN</td>
<td>Mixed use with primarily residential urban fabric</td>
<td>3-story with some variation</td>
<td>Streets, Squares, Greenways</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-5 URBAN CENTER</td>
<td>Mixed use that accommodate retail, offices, rowhouses and apartments</td>
<td>Street trees, sidewalks, buildings set close to the sidewalks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-6 URBAN CORE</td>
<td>Medium to high-density mixed-use buildings, entertainment, civic and cultural uses</td>
<td>Street trees, sidewalks, buildings set close to wide sidewalks</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **T-1** NATURAL Zone consists of lands approximating or reverting to a wilderness condition, including lands unsuitable for settlement due to topography, hydrology or vegetation.
- **T-2** RURAL Zone consists of sparsely settled lands in open or cultivated state. These include woodland, agricultural land, grassland, and irrigable desert. Typical buildings are farmhouses, agricultural buildings, cabins, and vilas.
- **T-3** Sub-Urban Zone consists of low density residential areas, adjacent to higher zones that some mixed use. Home occupations and outbuildings are allowed. Planting is naturalistic and setbacks are relatively deep. Blocks may be large and the roads irregular to accommodate natural conditions.
- **T-4** General Urban Zone consists of a mixed use but primarily residential urban fabric. It may have a wide range of building types: single, sideyard, and rowhouses. Setbacks and landscaping are variable. Streets with curbs and sidewalks define medium-sized blocks.
- **T-5** Urban Center Zone consists of higher density mixed-use building that accommodate retail, offices, rowhouses and apartments. It has a tight network of streets, with wide sidewalks, steady street tree planting and buildings set close to the sidewalks.
- **T-6** Urban Core Zone consists of the highest density and height, with the greatest variety of uses, and civic buildings of regional importance. It may have larger blocks; streets have steady street tree planting and buildings are set close to wide sidewalks. Typically only large towns and cities have an Urban Core Zone.
- **Civic Zone** consists of Civic Buildings and/or Civic Spaces appropriate to their Transect Zones.
- **Special Districts** consist of areas with buildings that by their function, disposition, or configuration cannot, or should not, conform to one or more of the six normative Transect Zones.
**PUBLIC FRONTAGES**

**A. General to all zones T1, T2, T3, T4, T5, T6**

1. **The Public Frontage contributes to the character of the Transect Zone, and includes the types of Sidewalk, Curb, Planter, Bicycle Facility, and Street Trees.**
2. **Public Frontages shall be designed as shown in Table 4A and Table 4B and allocated within Transect Zones as specified in Table 14d.**
3. **Within the Public Frontages, the prescribed types of Public Planting and Public Lighting shall be as shown in Table 4A, Table 4B, Table 5 and Table 6. The spacing may be adjusted by Warrant to accommodate specific site conditions.**

**B. Specific to zones T1, T2, T3**

1. **The Public Frontage shall include trees of various species, naturally clustered, as well as understory.**
2. **The introduced landscape shall consist primarily of native species requiring minimal irrigation, fertilization and maintenance. Lawn shall be permitted only by Warrant.**

**C. Specific to zone T4, T5, T6**

1. **The introduced landscape shall consist primarily of durable species tolerant of soil compaction.**

**D. Specific to zone T4**

1. **The Public Frontage shall include trees planted in a regularly-spaced Allee pattern of single or alternated species with shade canopies of a height that, at maturity, clears at least one Story.**

**E. Specific to zones T5, T6**

1. **The Public Frontage shall include trees planted in a regularly-spaced Allee pattern of single species with shade canopies of a height that, at maturity, clears at least one Story. At Retail Frontages, the spacing of the trees may be irregular, to avoid visually obscuring the shopfronts.**
2. **5 trees with a Right-of-Way width of 40 feet or less shall be exempt from the tree requirement.**

---

**PUBLIC & PRIVATE FRONTAGES**

**CARRIACOU FREE PORT**

DUMFRIES, CARRIACOU, GRENADA

[Image of progress set]
**TABLE 4A: Public Frontages - General.** The Public Frontage is the area between the private Lot line and the edge of the vehicular lanes. Dimensions are given in Table 4B.

| PLAN |
|-----------------|-----------------|
| LOT PRIVATE FRONTAGE | R.O.W. PUBLIC FRONTAGE |
| T1 | T2 | T3 |

**a. (RR) For Highway:** This Frontage has open Swales drained by percolation, Bicycle Trails and no parking. The landscaping consists of the natural condition or multiple species arranged in naturalistic clusters. Buildings are buffered by distance or berms.

**b. (RD) For Road:** This Frontage has open Swales drained by percolation and a walking Path or Bicycle Trail along one or both sides and yield parking. The landscaping consists of multiple species arranged in naturalistic clusters.

**c. (ST) For Street:** This Frontage raised Curbs drained by inlets and sidewalks are separated from the vehicular lanes by individual or continuous Planters, with parking on one or both sides. The landscaping consists of street trees of a single or alternating species aligned in a regularly spaced Alee, with the exception that Streets with a right-of-way (R.O.W.) width of 40 feet or less are exempt from tree requirements.

**d. (SR) For Drive:** This Frontage raised Curbs drained by inlets and a wide Sidewalk or paved Path along one side, related to a Greenway or waterfront. It is separated from the vehicular lanes by individual or continuous Planters. The landscaping consists of street trees of a single or alternating species aligned in a regularly spaced Alee.

**e. (AV) For Avenue:** This Frontage has raised Curbs drained by inlets and wide Sidewalks separated from the vehicular lanes by a narrow continuous Planter with parking on both sides. The landscaping consists of a single tree species aligned in a regularly spaced Alee.

**f. (CS) (AV) For Commercial Street or Avenue:** This Frontage has raised Curbs drained by inlets and very wide Sidewalks along both sides separated from the vehicular lanes by separate tree wells with grates and parking on both sides. The landscaping consists of a single tree species aligned with regular spacing, where possible, but clear the stormdrain entrances.

**g. (BV) For Boulevard:** This Frontage has Slip Roads on both sides. It consists of raised Curbs drained by inlets and Sidewalks along both sides, separated from the vehicular lanes by Planters. The landscaping consists of double rows of a single tree species aligned in a regularly spaced Alee.

---

**TABLE 7: Private Frontages.** The Private Frontage is the area between the building Facades and the Lot lines.

| SECTION |
|-----------------|-----------------|
| LOT PRIVATE FRONTAGE | R.O.W. PUBLIC FRONTAGE |
| T4 | T5 | T6 |

**a. Common Yard:** a planted Frontage wherein the Facade is set back substantially from the Frontage Line. The front yard creates a terraced environment and is visually continuous with adjacent yards, supporting a common landscape. The deep setback provides a buffer from the higher speed through traffic.

**b. Porch & Fence:** a planted Frontage wherein the Facade is set back from the Frontage Line with an attached porch permitted to Encroach. A fence at the Frontage Line maintains street spatial definition. Porches shall be no less than 8 feet deep.

**c. Terrace or Lightwell:** a Frontage wherein the Facade is set back from the Frontage line by an elevated terrace or a sunken Lightwell. This type buffers and conceals residential use from the sidewalk and removes the private yard from public view through the trees. Terraces are suitable for conversion to outdoor patios.

**d. Forecourt:** a Frontage wherein a portion of the Facade is close to the Frontage Line and the central portion is set back. The Forecourt creates a visual buffer for vehicular drop-offs. This type should be located in conjunction with other Frontage types. Large trees within the forecourts may overhang the Sidewalk.

**e. Stoop:** a Frontage wherein the Facade is aligned close to the Frontage Line with the first Stair elevation from the Sidewalk sufficiently to secure privacy for the windows. This is usually an exterior stair and landing. This type is recommended for ground-floor Residential use.

**f. Stoopwell:** a Frontage wherein the Facade is aligned close to the Frontage Line with the building entrance at sidewalk grade. This type is suitable for retail use. It has a substantial overhang on the sidewalk level and an awning that may overhang the Sidewalk to within 2 feet of the Curb. Sym Retail Frontage.

**g. Gallery:** a Frontage wherein the Facade is aligned close to the Frontage line with an attached canopied porch or a lighted colonnade overhanging the Sidewalk. This type is suitable for retail use. The Gallery shall be no less than 10 feet wide and should overhang the sidewalk to within 2 feet of the Curb.

**h. Arcade:** an arcade of supporting columns that overhangs the Sidewalk, while the Facade at Sidewalk level remains at or behind the Frontage Line. This type is suitable for retail use. The Arcade shall be no less than 12 feet wide and should overhang the sidewalk to within 2 feet of the Curb. See Table 8.
THOROUGHFARE STANDARDS

A. Thoroughfares are intended for use by vehicular and pedestrian traffic and to provide access to Lots and Open Spaces.

B. Thoroughfares shall generally consist of vehicular lanes and Public Frontages.

C. Thoroughfares shall be designed in context with the urban form and desired design speed of the Transect Zones through which they pass. The Public Frontages of Thoroughfares that pass from one Transect Zone to another shall be adjusted accordingly or, alternatively, the Transect Zone may follow the alignment of the Thoroughfare to the depth of one Lot, retaining a single Public Frontage throughout its trajectory.

D. Within the most rural Zones (T1 and T2) pedestrian comfort shall be a secondary consideration of the Thoroughfare. Design conflict between vehicular and pedestrian generally shall be decided in favor of the vehicle. Within the more urban Transect Zones (T3 through T6) pedestrian comfort shall be a primary consideration of the Thoroughfare. Design conflict between vehicular and pedestrian movement generally shall be decided in favor of the pedestrian.

E. The Thoroughfare network shall be designed to define Blocks not exceeding the proscribed requirements. The perimeter shall be measured as the sum of Lot Frontage Lines. Block perimeter at the edge of the development parcel shall be subject to approval by Warrant.

F. All Thoroughfares shall terminate at other Thoroughfares, forming a network. Internal Thoroughfares shall connect wherever possible to those on adjacent sites. Cul-de-sacs shall be subject to approval by Warrant to accommodate specific site conditions only.

G. Each Lot shall Enfront a vehicular Thoroughfare, except that 20% of the Lots within each Transect Zone may Enfront a Passage.

H. Thoroughfares along a designated B-Grid may be exempted by Warrant from one or more of the specified Public Frontage or Private Frontage requirements.

I. Standards for Paths and Bicycle Trails shall be approved by Warrant.

J. The standards for Thoroughfares within Special Districts shall be determined by Variance.

VEHICULAR LINES

A. Thoroughfares may include vehicular lanes in a variety of widths for parked and for moving vehicles, including bicycles. The standards for vehicular lanes shall be as shown in Table 3A.

B. A bicycle network consisting of Bicycle Trails, Bicycle Routes and Bicycle Lanes should be provided throughout as defined in Article 7 Definitions of Terms and allocated as specified in Table 14d. Bicycle Routes should be marked with Sharrrows.

The community bicycle network shall be connected to existing or proposed regional networks wherever possible.
### TABLE 3B: Vehicular Lane/Parking Assemblies

The projected design speeds determine the dimensions of the vehicular lanes and Turning Radii assembled for Thoroughfares.

<table>
<thead>
<tr>
<th>NO PARKING</th>
<th>ONE WAY MOVEMENT</th>
<th>TWO WAY MOVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design ACT</td>
<td>200 ft/pk</td>
<td>300 ft/pk</td>
</tr>
<tr>
<td>Median Width</td>
<td>3 ft</td>
<td>5 ft</td>
</tr>
<tr>
<td>Shoulder Width</td>
<td>3 ft</td>
<td>5 ft</td>
</tr>
<tr>
<td>Design Speed</td>
<td>25 to 35 MPH</td>
<td>25 to 35 MPH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YIELD PARKING</th>
<th>T3</th>
<th>T4</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design ACT</td>
<td>1,000 ft/pk</td>
<td>1,000 ft/pk</td>
<td>1,000 ft/pk</td>
<td>1,000 ft/pk</td>
</tr>
<tr>
<td>Median Width</td>
<td>3 ft</td>
<td>5 ft</td>
<td>5 ft</td>
<td>5 ft</td>
</tr>
<tr>
<td>Shoulder Width</td>
<td>3 ft</td>
<td>5 ft</td>
<td>5 ft</td>
<td>5 ft</td>
</tr>
<tr>
<td>Design Speed</td>
<td>25 to 35 MPH</td>
<td>25 to 35 MPH</td>
<td>25 to 35 MPH</td>
<td>25 to 35 MPH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARKING</th>
<th>T3</th>
<th>T4</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design ACT</td>
<td>1,500 ft/pk</td>
<td>1,500 ft/pk</td>
<td>1,500 ft/pk</td>
<td>1,500 ft/pk</td>
</tr>
<tr>
<td>Median Width</td>
<td>3 ft</td>
<td>5 ft</td>
<td>5 ft</td>
<td>5 ft</td>
</tr>
<tr>
<td>Shoulder Width</td>
<td>3 ft</td>
<td>5 ft</td>
<td>5 ft</td>
<td>5 ft</td>
</tr>
<tr>
<td>Design Speed</td>
<td>25 to 35 MPH</td>
<td>25 to 35 MPH</td>
<td>25 to 35 MPH</td>
<td>25 to 35 MPH</td>
</tr>
</tbody>
</table>

### TABLE 3A: Vehicular Lane Dimensions

This table assigns lane widths to Thoroughfares. The Design ACT (Average Daily Traffic) is the determinant for each of these sections. The most typical assemblies are shown in Table 3B. Specific requirements for truck and transit bus routes and truck loading shall be decided by Warrant.

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>TRAVEL LANE WIDTH</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 20 mph</td>
<td>8 feet</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>20-25 mph</td>
<td>9 feet</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>25-35 mph</td>
<td>10 feet</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Above 35 mph</td>
<td>12 feet</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>PARKING LANE WIDTH</th>
<th>(A) Parallel 16 feet</th>
<th>(B) Parallel 10 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 20 mph</td>
<td>6-10 feet</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>20-25 mph</td>
<td>10-15 feet</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>25-35 mph</td>
<td>15-20 feet</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Above 35 mph</td>
<td>20-35 feet</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>EFFECTIVE TURNING RADIUS</th>
<th>(See Table 17b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 20 mph</td>
<td>6-10 feet</td>
<td>* * * * * * *</td>
</tr>
<tr>
<td>20-25 mph</td>
<td>10-15 feet</td>
<td>* * * * * * *</td>
</tr>
<tr>
<td>25-35 mph</td>
<td>15-20 feet</td>
<td>* * * * * * *</td>
</tr>
<tr>
<td>Above 35 mph</td>
<td>20-35 feet</td>
<td>* * * * * * *</td>
</tr>
</tbody>
</table>

*BY RIGHT
*BY WARRANT

**VEHICULAR ASSEMBLIES & DIMENSIONS**

**CARRIACOU FREE PORT**

DUMFRIES, CARRIACOU, GRENADA

**WWW.KOSIKARP.COM**

68
TABLE 9: Building Disposition. This table approximates the location of the structure relative to the boundaries of each individual Lot, establishing suitable building types for each Transect Zone.

a. Edgeway: Specific Types - single family House, cottage, villa, estate house, urban villa. A building that occupies the center of its Lot with setbacks on all sides. This is the most urban of types as the front yard sets a back from the Frontage, while the side yards serve as a spatial definition of the public-Thoroughfare space. The front yard is intended to be visually continuous with the yards of adjacent buildings. The rear yard can be secured for privacy by fences and a well-placed Screenbuilding and/or Outbuilding.

b. Sideyard: Specific Types - Charleston single house, double house, zero lot line house, twin. A building that occupies one side of the Lot with the Setback to the other side. A shallow lotage Setback defines a more urban condition. If the adjacent building is similar with a blank side wall, the yard can be quite private. This type permits systematic climatic orientation in response to the sun or the breeze. For Sideyard House, the type is known as a row or double house. Energy costs, and sometimes noise, are reduced by sharing a party wall in this Disposition.

c. Rearyard: Specific Types - Rowhouse, Rowhouse, Live-Work unit, high building. Apartment House, Mixed Use Block, Flat Building, annexed Building. A building that occupies the Lot, leaving the rear of the Lot on the side yard. This is a very urban type as the continuous Facade defines the public-Thoroughfare. The rear elevations may be articulated for functional purposes. In its Residential form, this type is the Rowhouse. For its Commercial form, the rear yard can accommodate substantial paving.

d. Courtyard: Specific Types - estate House. A building that occupies the boundaries of its Lot while internally defining one or more private patios. This is the most urban of types, able to shield the private realm from all sides while defining the public-Thoroughfare. Because of its ability to accommodate incompatible activities, without scale to the streets, it is recommended for workshops, Lodging and schools. The high security provided by the continuous enclosure is useful for crime-prone areas.

e. Specialized: A building that is not subject to categorization. Buildings dedicated to manufacturing and transportation are often distorted by the trajectories of machinery. Civic buildings, which may express the aspirations of institutions, may be included.

TABLE 8: Building Configuration. This table shows the Configurations for different building heights for each Transect Zone. It must be modified to show actual calibrated heights for local conditions. Revisions Lines and Expression Lines shall occur on higher buildings as shown. N = maximum height as specified in Table 14k.
### TABLE 10: Building Function
This table categorizes Building Functions within Transect Zones. Parking requirements are correlated to functional intensity. For Specific Function and Use permitted by Right or by Warrant, see Table 12.

<table>
<thead>
<tr>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a. RESIDENTIAL</strong></td>
<td>Restricted Residential: The number of dwellings on each lot is limited to one within a Principal Building and one within an Accessory Building, with 2.0 parking spaces each. Each dwelling shall be owner-occupied. The minimum floor area of the Accessory Building shall not exceed 440 square feet of the parking area.</td>
<td>Limited Residential: The number of dwellings on each lot is limited by the requirement of 1.0 assigned parking spaces for each dwelling, a ratio which may be reduced according to the shared parking standards (See Table 11).</td>
<td>Open Residential: The number of dwellings on each lot is limited by the requirement of 1.0 assigned parking spaces for each dwelling, a ratio which may be reduced according to the shared parking standards (See Table 11).</td>
<td></td>
</tr>
<tr>
<td><strong>b. LODGING</strong></td>
<td>Restricted Lodging: The number of bedrooms available on each lot for lodging is limited by the requirement of 0.75 assigned parking spaces for each bedroom, up to five, in addition to the parking requirement for the dwelling. The lodging must be owner-occupied. Food service may be provided in the area. The maximum length of stay shall not exceed 10 days.</td>
<td>Limited Lodging: The number of bedrooms available on each lot for lodging is limited by the requirement of 0.75 assigned parking spaces for each bedroom, up to twelve, in addition to the parking requirement for the dwelling. The lodging must be owner-occupied. Food service may be provided in the area. The maximum length of stay shall not exceed 10 days.</td>
<td>Open Lodging: The number of bedrooms available on each lot for lodging is limited by the requirement of 0.75 assigned parking spaces for each bedroom. Food service may be provided at all times. The area allocated for food service shall be calculated and provided with parking according to Retail Function.</td>
<td></td>
</tr>
<tr>
<td><strong>c. OFFICE</strong></td>
<td>Restricted Office: The building area available for office use on each lot is limited to the first story of the Principal Building and Accessory Building, and by the requirement of 3.0 assigned parking spaces per 1000 square feet of net office space in addition to the parking requirement for each dwelling.</td>
<td>Limited Office: The building area available for office use on each lot is limited to the first story of the Principal Building and Accessory Building, and by the requirement of 3.0 assigned parking spaces per 1000 square feet of net office space in addition to the parking requirement for each dwelling.</td>
<td>Open Office: The building area available for office use on each lot is limited by the requirement of 3.0 assigned parking spaces per 1000 square feet of net office space.</td>
<td></td>
</tr>
<tr>
<td><strong>d. RETAIL</strong></td>
<td>Restricted Retail: The building area available for Retail use is restricted to one Block corner location at the first story for each 300 dwelling units and by the requirement of 4.0 assigned parking spaces per 1000 square feet of net Retail space in addition to the parking requirement for each dwelling. The specific use shall be further limited to neighborhoods or food service seating no more than 10 seats.</td>
<td>Limited Retail: The building area available for Retail use is limited to the first story of buildings at corner locations, not more than one per Block, and by the requirement of 4.0 assigned parking spaces per 1000 square feet of net Retail space in addition to the parking requirement for each dwelling. The specific use shall be further limited to neighborhoods or food service seating no more than 10 seats.</td>
<td>Open Retail: The building area available for Retail use is limited by the requirement of 4.0 assigned parking spaces per 1000 square feet of net Retail space. Retail spaces under 1000 square feet are exempt from parking requirements.</td>
<td></td>
</tr>
<tr>
<td><strong>e. CIVIC</strong></td>
<td>To be determined by Warrant</td>
<td>See Table 12</td>
<td>See Table 12</td>
<td>See Table 12</td>
</tr>
<tr>
<td><strong>f. OTHER</strong></td>
<td>To be determined by Warrant</td>
<td>See Table 12</td>
<td>See Table 12</td>
<td>See Table 12</td>
</tr>
</tbody>
</table>

### TABLE 11: Parking Calculations
The Shared Parking Factor for two functions, when divided into the sum of the two amounts as listed on the Required Parking table below, produces the Effective Parking needed for each site involved in sharing. Conversely, if the Sharing Factor is used as a multiplier, it indicates the amount of building parking allowed on each site given the parking available.

<table>
<thead>
<tr>
<th>REQUIRED PARKING (See Table 10):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T2</strong></td>
</tr>
<tr>
<td>RESIDENTIAL</td>
</tr>
<tr>
<td>LODGING</td>
</tr>
<tr>
<td>OFFICE</td>
</tr>
<tr>
<td>RETAIL</td>
</tr>
<tr>
<td>CIVIC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SHARED PARKING FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
</tr>
<tr>
<td>RESIDENTIAL</td>
</tr>
<tr>
<td>LODGING</td>
</tr>
<tr>
<td>OFFICE</td>
</tr>
<tr>
<td>RETAIL</td>
</tr>
</tbody>
</table>

### CARRIACOU FREE PORT
DUMBRIES, CARRIACOU, GRENADA

[www.kosikarp.com](http://www.kosikarp.com)
**TABLE 6: Public Planting.** This table shows six common types of street tree shapes and their appropriateness within the Transect Zones. The local planning office selects species appropriate for the bioregion.

<table>
<thead>
<tr>
<th>Tree</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
<th>SD</th>
<th>Specific Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Dell</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Bell</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Pyramid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Umbrella</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Vase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 5: Public Lighting.** Lighting varies in brightness and also in the character of the fixture according to the Transect. The table shows five common types. A listed set of streetlights corresponding to these types would be approved by the utility company and listed on the page.

<table>
<thead>
<tr>
<th>Type</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
<th>SD</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobra Head</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Pipe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Column</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Double Column</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td></td>
</tr>
</tbody>
</table>
Place making is not just the act of building or fixing up a space, but a whole process that fosters the creation of vital public destinations; the kind of places where people feel a strong stake in their communities and a commitment to making things better. Simply put, placemaking capitalizes on a local community’s assets, inspiration, and potential, ultimately creating good public spaces that promote people’s health, happiness, and well being. As our survey responses suggest, this process is essential—even sacred—to people who truly care about the places in their lives.

Placemaking is both a process and a philosophy. It takes root when a community expresses needs and desires about places in their lives, even if there is not yet a clearly defined plan of action. The yearning to unite people around a larger vision for a particular place is often present long before the word “placemaking” is ever mentioned. Once the term is introduced, however, it enables people to realize just how inspiring their collective vision can be, and allows them to look with fresh eyes at the potential of parks, downtowns, waterfronts, plazas, neighborhoods, streets, markets, campuses and public buildings. It sparks an exciting re-examination of everyday settings and experiences in our lives.

Experience has shown us that when developers and planners welcome as much grassroots involvement as possible, they spare themselves a lot of headaches. Common problems like traffic-dominated streets, little-used parks, and isolated, underperforming development projects can be avoided by embracing the placemaking perspective that views a place in its entirety, rather than zeroing in on isolated fragments of the whole.

A public space is a social space such as a town square that is open and accessible to all, regardless of gender, race, ethnicity, age or socio-economic level. One of the earliest examples of public spaces are commons. For example, no fees or paid tickets are required for entry, nor are the entrants discriminated based on background. Non-government-owned malls are examples of ‘private space’ with the appearance of being ‘public space’. Public space has also become something of a touchstone for critical theory in relation to philosophy, (urban) geography, visual art, cultural studies, social studies and urban design. The term ‘Public Space’ is also often misconstrued to mean other things such as ‘gathering place’, which is an element of the larger concept of social space.
A transfer of development rights (TDR) allows for the transfer of unused development rights from one zoning lot to another in special circumstances, usually to promote the preservation of historic buildings, open space or unique cultural resources. For such purposes, a TDR is permitted where the transfer could not be accomplished through a zoning lot merger because certain conditions, such as intervening streets, separate the zoning lots.

Generally, TDR programs are established by local zoning ordinances. In the context of farmland protection, TDR is used to shift development from agricultural areas to designated growth zones closer to municipal services. The parcel of land where the rights originate is called the “sending” parcel. When the rights are transferred from a sending parcel, the land is restricted with a permanent conservation easement. The parcel of land to which the rights are transferred is called the “receiving” parcel. Buying these rights generally allows the owner to build at a higher density than ordinarily permitted by the base zoning. TDR is known as transfer of development credits (TDC) in California and in some regions of New Jersey.

TDR programs are based on the concept that property owners have a bundle of different rights, including the right to use land, lease, sell and bequeath it, borrow money using it as security, construct buildings on it and mine it, subject to reasonable local land use regulations. Some or all of these rights can be transferred or sold to another person. When a landowner sells property, generally all the rights are transferred to the buyer. TDR programs enable landowners to separate and sell the right to develop land from their other property rights.

TDR is most suitable in places where large blocks of land remain in farm use. In communities with a fragmented agricultural land base, it is difficult to find a suitable sending area. Jurisdictions also must be able to identify receiving areas that can accommodate the development to be transferred out of the farming area. The receiving areas must have the physical capacity to absorb new units, and residents of those areas must be willing to accept higher density development. Often, residents of potential receiving areas must be persuaded that the benefits of protecting farmland outweigh the costs of living in a more compact neighborhood. TDR programs are distinct from purchase of agricultural conservation easement (PACE) programs because they involve the private market. Most TDR transactions are between private landowners and developers. Local governments generally do not have to raise taxes or borrow funds to implement TDR. A few jurisdictions have experimented with public purchase and “banking” of development rights. A TDR bank buys development rights with public funds and sells the rights to private landowners.

Development rights generally refer to the maximum amount of floor area permissible on a zoning lot. The difference between the maximum permitted floor area and actual floor area is referred to as “unused development rights.” Unused development rights are often described as air rights.

A zoning lot merger is the joining of two or more adjacent zoning lots into one new zoning lot. Unused development rights may be shifted from one lot to another, as-of-right, only through a zoning lot merger.
THE PRINCIPLES OF URBANISM CAN BE APPLIED INCREASINGLY TO PROJECTS AT THE FULL RANGE OF SCALES FROM A SINGLE BUILDING TO AN ENTIRE COMMUNITY.

1. **Walkability**
   - Most things within a 10-minute walk of home and work
   - Pedestrian friendly street design (buildings close to street; porches, windows & doors; tree-lined streets; on street parking; hidden parking lots; garages in rear lane; narrow, slow speed streets)
   - Pedestrian streets free of cars in special cases

2. **Connectivity**
   - Interconnected street grid network disperses traffic & eases walking
   - A hierarchy of narrow streets, boulevards, and alleys
   - High quality pedestrian network and public realm makes walking pleasurable

3. **Mixed-Use & Diversity**
   - A mix of shops, offices, apartments, and homes on site. Mixed-use within neighborhoods, within blocks, and within buildings
   - Diversity of people – of ages, income levels, cultures, and races

4. **Mixed Housing**
   - A range of types, sizes and prices in closer proximity

5. **Quality Architecture & Urban Design**
   - Emphasis on beauty, aesthetics, human comfort, and creating a sense of place; Special placement of civic uses and sites within community. Human scale architecture & beautiful surroundings nourish the human spirit

6. **Traditional Neighborhood Structure**
   - Discernable center and edge
   - Public space at center
   - Importance of quality public realm; public open space designed as civic art
   - Contains a range of uses and densities within 10-minute walk
   - Transect planning: Highest densities at town center; progressively less dense towards the edge. The transect is an analytical system that conceptualizes mutually reinforcing elements, creating a series of specific natural habitats and/or urban lifestyle settings. The transect integrates environmental methodology for habitat assessment with zoning methodology for community design. The professional boundary between the natural and man-made disappears, enabling environmentalists to assess the design of the human habitat and the urbanists to support the viability of nature. This urban-to-rural transect hierarchy has appropriate building and street types for each area along the continuum.

7. **Increased Density**
   - More buildings, residences, shops, and services closer together for ease of walking, to enable a more efficient use of services and resources, and to create a more convenient, enjoyable place to live.
   - New urbanism design principles are applied at the full range of densities from small towns, to large cities

8. **Green Transportation**
   - A network of high-quality trains connecting cities, towns, and neighborhoods together
   - Pedestrian-friendly design that encourages a greater use of bicycles, roller blades, scooters, and walking as daily transportation

9. **Sustainability**
   - Minimal environmental impact of development and its operations
   - Eco-friendly technologies, respect for ecology and value of natural systems
   - Energy efficiency
   - Less use of finite fuels
   - More local production
   - More walking, less driving

10. **Quality of Life**
    - Taken together these add up to a high quality of life well worth living, and create places that enrich, uplift, and inspire the human spirit.
1. BENEFITS TO RESIDENTS
Higher quality of life; Better places to live, work, and play; Higher, more stable property values; Less traffic congestion & less driving; Healthier lifestyle with more walking, and less stress; Close proximity to main street retail & services; Close proximity to bike trails, parks, and nature; Pedestrian friendly communities offer more opportunities to get to know others in the neighborhood and town, resulting in meaningful relationships with more people, and a friendlier town; More freedom and independence to children, elderly, and the poor in being able to get to jobs, recreation, and services without the need for a car or someone to drive them; Great savings to residents and school boards in reduced busing costs from children being able to walk or bicycle to neighborhood schools; More diversity and smaller, unique shops and services with local owners who are involved in community; Big savings by driving less, and owning less cars; Less ugly, congested sprawl to deal with daily; Better sense of place and community identity with more unique architecture; More open space to enjoy that will remain open space; More efficient use of tax money with less spent on spread out utilities and roads.

2. BENEFITS TO BUSINESSES
Increased sales due to more foot traffic & people spending less on cars and gas; More profits due to spending less on advertising and large signs; Better lifestyle by living above shop in live-work units - saves the stressful & costly commute; Economies of scale in marketing due to close proximity and cooperation with other local businesses; Smaller spaces promote small local business incubation; Lower rents due to smaller spaces & smaller parking lots; Healthier lifestyle due to more walking and being near healthier restaurants; More community involvement from being part of community and knowing residents.

3. BENEFITS TO DEVELOPERS
More income potential from higher density mixed-use projects due to more leasable square footage, more sales per square foot, and higher property values and selling prices; Faster approvals in communities that have adopted smart growth principles resulting in cost / time savings; Cost savings in parking facilities in mixed-use properties due to sharing of spaces throughout the day and night, resulting in less duplication in providing parking; Less need for parking facilities due to mix of residences and commercial uses within walking distance of each other; Less impact on roads / traffic, which can result in lower impact fees; Lower cost of utilities due to compact nature of New Urbanist design; Greater acceptance by the public and less resistance from NIMBYs; Faster sell out due to greater acceptance by consumers from a wider product range resulting in wider market share.

4. BENEFITS TO MUNICIPALITIES
Stable, appreciating tax base; Less spent per capita on infrastructure and utilities than typical suburban development due to compact, high-density nature of projects; Increased tax base due to more buildings packed into a tighter area; Less traffic congestion due to walkability of design; Less crime and less spent on policing due to the presence of more people day and night; Less resistance from community; Better overall community image and sense of place; Less incentive to sprawl when urban core area is desirable; Easy to install transit where it’s not, and improve it where it is; Greater civic involvement of population leads to better governance.

BENEFITS OF URBANISM
CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENADA

PROGRESS SET
WWW.KOBIKARP.COM
75
Sustainable energy is the provision of energy such that it meets the needs of the present without compromising the ability of future generations to meet their needs. Sustainable energy sources are most often regarded as including all renewable sources, such as plant matter, solar power, wind power, wave power, geothermal power and tidal power. It usually also includes technologies that improve energy efficiency. Conventional fission power is sometimes referred to as sustainable, but this is controversial politically due to concerns about peak uranium, radioactive waste disposal, and the risks of disaster due to accident, terrorism, or natural disaster.

**Renewable Energy Systems**
- Biofuel
- Biomass
- Geothermal
- Hydroelectricity
- Solar energy
- Tidal power
- Wave power
- Wind power

Green energy is the term used to describe sources of energy that are considered to be environmentally friendly and non-polluting, such as geothermal, wind, solar, and hydro. Sometimes nuclear power is also considered a green energy source.

Green energy sources are often considered “green” because they are perceived to lower carbon emissions and create less pollution.

Green energy is commonly thought of in the context of electricity generation. A fuller picture requires appreciation of efficient energy use as well as mechanical power, heating and cogeneration. Consumers, businesses, and organizations may purchase green energy to support further development, help reduce the environmental impacts of conventional electricity generation, and increase their nation’s energy independence.

Renewable energy certificates (green certificates or green tags) have been one way for consumers and businesses to support green energy.

Green energy incorporates natural energetic processes that can be harnessed with little pollution. Anaerobic digestion, geothermal power, wind power, small-scale hydropower, solar energy, biomass power, tidal power, and wave power fall under such a category. Some definitions may also include power derived from the incineration of waste.

No power source is entirely impact-free. All energy sources require energy and give rise to some degree of pollution from manufacture of the technology. However, by using renewable and sustainable systems we can minimize the impact on the environment.
Renewable energy sources, the manufacture of solar cells and photovoltaic arrays has advanced considerably in recent years. Polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide/sulfide. Due to the growing demand for renewable energy sources, the manufacture of solar cells and photovoltaic arrays is now replacing other sources in the developing world.

Concentrating Solar Power (CSP) systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. The concentrated heat is then used as a heat source for a conventional power plant. A wide range of concentrating technologies exists; the most developed are the parabolic trough, the concentrating linear Fresnel reflector, the Stirling dish and the solar power tower. Various techniques are used to track the sun and focus light. In all of these systems a working fluid is heated by the concentrated sunlight, and is then used for power generation or energy storage.

A parabolic trough consists of a linear parabolic reflector that concentrates light onto a receiver positioned along the reflector’s focal line. The receiver is a tube positioned right above the middle of the parabolic mirror and is filled with a working fluid. The reflector is made to follow the sun during the daylight hours by tracking along a single axis. Parabolic trough systems provide the best land-use factor of any solar technology. Concentrating linear Fresnel reflectors are CSP-plants which use many thin mirror strips instead of parabolic mirrors to concentrate sunlight onto two tubes with working fluid. This has the advantage that flat mirrors can be used which are much cheaper than parabolic mirrors, and that more reflectors can be placed in the same amount of space, allowing more of the available sunlight to be used. Concentrating linear Fresnel reflectors can be used in either large or more compact plants.

A Stirling solar dish, or dish engine system, consists of a stand-alone parabolic reflector that concentrates light onto a receiver positioned at the reflector’s focal point. The reflector tracks the sun along two axes. Parabolic dish systems give the highest efficiency among CSP technologies. The Stirling solar dish combines a parabolic concentrating dish with a Stirling heat engine which normally drives an electric generator. The advantages of Stirling solar over photovoltaic cells are higher efficiency of converting sunlight into electricity and longer lifetime.

A solar power tower uses an array of tracking reflectors (heliostats) to concentrate light on a central receiver atop a tower. Power towers are more cost effective, offer higher efficiency and better energy storage capability among CSP technologies.

Photovoltaics (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels comprising a number of cells containing a photovoltaic material. Materials presently used for photovoltaics include monocrystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide/sulfide. Due to the growing demand for renewable energy sources, the manufacture of solar cells and photovoltaic arrays has advanced considerably in recent years.
Biomass, a renewable energy source, is biological material from living, or recently living organisms, such as wood, waste, (hydrogen) gas, and alcohol fuels. Biomass is commonly plant matter grown to generate electricity or produce heat. In this sense, living biomass can also be included, as plants can also generate electricity while still alive.[2] The most conventional way in which biomass is used however, still relies on direct incineration. Forest residues for example (such as dead trees, branches and tree stumps), yard cuppings, wood chips and garbage are often used for this. However, biomass also includes plant or animal matter used for production of fibers or chemicals. Biomass may also include biodegradable wastes that can be burnt as fuel. It excludes organic materials such as fossil fuels which have been transformed by geological processes into substances such as coal or petroleum.

Industrial biomass can be grown from numerous types of plants, including Miscanthus, Switchgrass, hemp, corn, poplar, willow, sorghum, sugarcane, and a variety of tree species, ranging from eucalyptus to oil palm (palm oil). The particular plant used is usually not important to the end products, but it does affect the processing of the raw material. Although fossil fuels have their origin in ancient biomass, they are not considered biomass by the generally accepted definition because they contain carbon that has been “out” of the carbon cycle for a very long time. Their combustion therefore disturbs the carbon dioxide content in the atmosphere.

Biomass energy is derived from five distinct energy sources: garbage, wood, waste, landfill gases, and alcohol fuels. Wood energy is derived both from direct use of harvested wood as a fuel and from wood waste streams. The largest source of energy from wood is pulp liquors or “black liquor,” a waste product from processes of the pulp, paper and paperboard industry. Waste energy is the second-largest source of biomass energy. The main contributors of waste energy are municipal solid waste (MSW), manufacturing waste, and landfill gas. Biomass alcohol fuel, or ethanol, is derived primarily from sugarcane and corn. It can be used directly as a fuel or as an additive to gasoline.

Biomass can be converted to other usable forms of energy like methane gas or transportation fuels like ethanol and biodiesel. Methane gas is the main ingredient of natural gas. Smelly stuff, like rotting garbage, and agricultural and human waste, release methane gas - also called “landfill gas” or “biogas.” Crops like corn and sugar cane can be fermented to produce the transportation fuel, ethanol. Biodiesel, another transportation fuel, can be produced from left-over food products like vegetable oils and animal fats. Also, biomass to liquids (BTLs) and cellulosic ethanol are still under research.
Wave power is the transport of energy by ocean surface waves, and the capture of that energy to do useful work — for example for electricity generation, water desalination, or the pumping of water (into reservoirs).

Wave power is distinct from the diurnal flux of tidal power and the steady gyre of ocean currents. Wave power generation is not currently a widely employed commercial technology although there have been attempts at using it since at least 1890. In 2008, an attempt was made at creating a commercial wave farm in Portugal, at the Aguçadoura Wave Park. The wave farm consisted of three 750 kilowatt Pelamis devices.[3] In November 2008 just two months after the official opening the Pelamis machines were brought back to harbor at Leixões due to a technical problem with some of the bearings.

Waves are generated by wind passing over the surface of the sea. As long as the waves propagate slower than the wind speed just above the waves, there is an energy transfer from the wind to the waves. Both air pressure differences between the upwind and the lee side of a wave crest, as well as friction on the water surface by the wind, making the water to go into the shear stress causes the growth of the waves. Wave height is determined by wind speed, the duration of time the wind has been blowing, fetch (the distance over which the wind excites the waves) and by the depth and topography of the seafloor (which can focus or disperse the energy of the waves). A given wind speed has a matching practical limit over which time or distance will not produce larger waves. When this limit has been reached the sea is said to be “fully developed”. In general, larger waves are more powerful but wave power is also determined by wave speed, wavelength, and water density.

Oscillatory motion is highest at the surface and diminishes exponentially with depth. However, for standing waves (clapots) near a reflecting coast, wave energy is also present as pressure oscillations at great depth, producing microseisms. These pressure fluctuations at greater depth are too small to be interesting from the point of view of wave power. The waves propagate on the ocean surface, and the wave energy is also transported horizontally with the group velocity. The mean transport rate of the wave energy through a vertical plane of unit width, parallel to a wave crest, is called the wave energy flux (or wave power, which must not be confused with the actual power generated by a wave power device).
Wind power is the conversion of wind energy into a useful form of energy, such as using wind turbines to make electricity, wind mills for mechanical power, wind pumps for pumping water or drainage, or sails to propel ships.

At the end of 2009, worldwide nameplate capacity of wind-powered generators was 159.2 gigawatts (GW). Energy production was 340 TWh, which is about 2% of worldwide electricity usage, and has doubled in the past three years. Several countries have achieved relatively high levels of wind power penetration (with large governmental subsidies), such as 20% of stationary electricity production in Denmark, 14% in Ireland and Portugal, 11% in Spain, and 8% in Germany in 2009. As of May 2009, 80 countries around the world are using wind power on a commercial basis.

Large-scale wind farms are connected to the electric power transmission network; smaller facilities are used to provide electricity to isolated locations. Utility companies increasingly buy back surplus electricity produced by small domestic turbines. Wind energy, as an alternative to fossil fuels, is plentiful, renewable, widely distributed, clean, and produces no greenhouse gas emissions during operation. However, the construction of wind farms is not universally welcomed because of their visual impact and other effects on the environment.

Wind power is non-dispatchable, meaning that for economic operation, all of the available output must be taken when it is available. Other resources, such as hydropower, and load management techniques must be used to match supply with demand. The intermittency of wind seldom creates problems when using wind power to supply a low proportion of total demand, but as the proportion rises, problems are created such as increased costs, the need to upgrade the grid, and a lowered ability to supplant conventional production. Power management techniques such as exporting excess power to neighboring areas or reducing demand when wind production is low, can mitigate these problems.
Overview of Geothermal Power

Geothermal energy (from the Greek roots geo, meaning earth, and thermos, meaning heat) is generated by heat stored beneath the Earth’s surface and has been developed and used around the world for centuries for power generation, space conditioning, and direct use heating and drying. The energy originates from the original formation of the planet, from radioactive decay of minerals, from volcanic activity and from solar energy absorbed at the surface. It has been used for bathing since Paleolithic times and for space heating since ancient Roman times, but is now better known for generating electricity. It is typically generated using naturally occurring hydrothermal convection systems that form when water seeps into the Earth’s crust, is heated, and is then forced to the surface through existing fracture networks in the rocks. Natural hydrothermal geothermal systems are created by drilling wellbores into the rock to channel the pressurized, heated fluids for direct use or to generate electricity via a conventional turbine.

Benefits of Geothermal Power

Geothermal power is cost effective, reliable, sustainable, and environmentally friendly, but has historically been limited to areas near tectonic plate boundaries. Recent technological advances have dramatically expanded the range and size of viable resources, especially for applications such as home heating, opening a potential for widespread exploration. Geothermal wells release greenhouse gases trapped deep within the Earth, but these emissions are much lower per energy unit than those of fossil fuels. As a result, geothermal power has the potential to help mitigate global warming if widely deployed in place of fossil fuels.

Geothermal energy is clean. It produces minimal air emissions in comparison to fossil-fuel-fired power plants. Emissions of nitrous oxide, hydrogen sulfide, sulfur dioxide, particulate matter, and carbon dioxide are extremely low. Read more about geothermal air emissions. Geothermal power does not produce radioactive wastes (which need to be stored for 10,000 years). The heat extracted from the Earth is renewed over time through convection, making the system renewable. Water extracted in traditional hydrothermal plants can be replenished with municipal waste water. Unlike wind and solar renewable energy sources, geothermal resources are available 24 hours a day regardless of weather or time of day. This makes geothermal power the only clean solution capable of replacing base-load coal or nuclear plants.

Geothermal power does not rely on foreign imports. Geothermal power requires no fuel (except for pumps), and is therefore immune to fuel cost fluctuations. Geothermal power is highly scalable: from a rural village to an entire

GEOTHERMAL POWER

CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENADE
**Geothermal Energy** is heat (thermal) derived from the earth (geo). It is the thermal energy contained in the rock and fluid (that fills the fractures and pores within the rock) in the earth’s crust.

Calculations show that the earth, originating from a completely molten state, would have cooled and become completely solid many thousands of years ago without an energy input in addition to that of the sun. It is believed that the ultimate source of geothermal energy is radioactive decay occurring deep within the earth (Burkland, 1973).

In most areas, this heat reaches the surface in a very diffuse state. However, due to a variety of geological processes, some areas, including substantial portions of many western states, are underlain by relatively shallow geothermal resources.

These resources can be classified as low temperature (less than 90°C or 194°F), moderate temperature (90°C - 150°C or 194 - 302°F), and high temperature (greater than 150°C or 302°F). The uses to which these resources are applied are also influenced by temperature. The highest temperature resources are generally used only for electric power generation. Current U.S. geothermal electric power generation totals approximately 2200 MW or about the same as four large nuclear power plants. Uses for low and moderate temperature resources can be divided into two categories: direct use and ground-source heat pumps.

**Direct use**, as the name implies, involves using the heat in the water directly (without a heat pump or power plant) for such things as heating of buildings, industrial processes, greenhouses, aquaculture (growing of fish) and resorts. Direct use projects generally use resource temperatures between 38°C (100°F) to 149°C (300°F). Current U.S. installed capacity of direct use systems totals 470 MW or enough to heat 40,000 average-sized houses.

**Ground-source heat pumps** use the earth or groundwater as a heat source in winter and a heat sink in summer. Using resource temperatures of 4°C (40°F) to 38°C (100°F), the heat pump, a device which moves heat from one place to another, transfers heat from the soil to the house in winter and from the house to the soil in summer. Accurate data is not available on the current number of these systems; however, the rate of installation is thought to be between 10,000 and 40,000 per year.

The current production of geothermal energy from all uses places third among renewables, following hydroelectricity and biomass, and ahead of solar and wind. Despite these impressive statistics, the current level of geothermal use pales in comparison to its potential. The key to wider geothermal use is greater public awareness and technical support.
Hydroponics (from the Greek words hydro, water and ponos, labor) is a method of growing plants using mineral nutrient solutions, in water, without soil. Terrestrial plants may be grown with their roots in the mineral nutrient solution only or in an inert medium, such as perlite, gravel, mineral wool, or coconut husk.

The two main types of hydroponics are solution culture and medium culture. Solution culture does not use a solid medium for the roots, just the nutrient solution. The three main types of solution culture are static solution culture, continuous flow solution culture and aeroponics. The medium culture method has a solid medium for the roots and is named for the type of medium, e.g. sand culture, gravel culture or rockwool culture. There are two main variations for each medium, subirrigation and top irrigation. For all techniques, most hydroponic reservoirs are now built of plastic but other materials have been used including concrete, glass, metal, vegetable solids and wood. The containers should exclude light to prevent algae growth in the nutrient solution.

With pest problems reduced, and nutrients constantly fed to the roots, productivity in hydroponics is high, although plant growth can be limited by the low levels of carbon dioxide in the atmosphere, or limited light exposure. To increase yield further, some sealed greenhouses inject carbon dioxide into their environment to help growth (CO2 enrichment), add lights to lengthen the day, or control vegetative growth etc.
Conservation of native plants, wildlife habitat, wetlands, and water bodies. By creating and committing to implement a long-term (at least ten-year) management plan for native habitats, water bodies, and/or wetlands and their buffers, and create a guaranteed funding source for management. Involving a qualified biologist or a professional from a natural resources agency or natural resources consulting firm in writing the management plan and conducting or evaluating the ongoing management. The plan should include biological objectives consistent with habitat and/or water resource conservation, and it must identify the following:

1. Procedures, including personnel to carry them out, for maintaining the conservation areas;
2. Estimated implementation costs and funding sources; and
3. Threats that the project poses for habitat and/or water resources within conservation areas (e.g., introduction of exotic species, intrusion of residents in habitat areas) and measures to substantially reduce those threats. The project does not meet the requirements if it has negative effects on habitat for species.
Habitat conservation is a land management practice that seeks to conserve, protect and restore, habitat areas for wild plants and animals, especially conservation reliant species, and prevent their extinction, fragmentation or reduction in range. It is a priority of many groups that cannot be easily characterized in terms of any one ideology.

Most of the species extinctions from 1000 AD to 2000 AD are due to human activities, in particular destruction of plant and animal habitats. Raised rates of extinction are being driven by human consumption of organic resources, especially related to tropical forest destruction. While most of the species that are becoming extinct are not food species, their biomass is converted into human food when their habitat is transformed into pasture, cropland, and orchards. It is estimated that more than a third of the Earth’s biomass is tied up in only the few species that represent humans, livestock and crops. Because an ecosystem decreases in stability as its species are made extinct, these studies warn that the global ecosystem is destined for collapse if it is further reduced in complexity. Factors contributing to loss of biodiversity are: overpopulation, deforestation, pollution (air pollution, water pollution, soil contamination) and global warming or climate change, driven by human activity. These factors, while all stemming from overpopulation, produce a cumulative impact upon biodiversity.

Consulting with the local Natural Heritage Program and local fish and wildlife agencies to determine whether species listed as threatened or endangered have been or are likely to be found on the project site because of the presence of suitable habitat and nearby occurrences. If the consultations are inconclusive and site conditions indicate that imperiled species or ecological communities could be present, using a qualified biologist, perform biological surveys using accepted methodologies during appropriate seasons to determine whether such species or communities occur or are likely to occur on the site.

The consultation and any necessary biological surveys determine that no such imperiled species or ecological communities have been found or have a high likelihood of occurring. For sites with affected species or ecological community, the Habitat Conservation Plan should comply with an approved habitat conservation plan under the Endangered Species Act for each identified species or ecological community. Equivalent work should be completed by a qualified biologist, a nongovernmental conservation organization, or the appropriate local authority, regional, or local agency to create and implement a conservation plan that includes the following actions:

A. Identify and map the extent of the habitat and the appropriate buffer, not less than 100 feet, according to best available scientific information.

B. To the maximum extent practicable, protect the identified habitat and buffer in perpetuity by donating or selling the land or a conservation easement on the land to an accredited land trust or relevant public agency.

C. If on-site protection can be accomplished, analyze threats from development and develop a monitoring and management plan that eliminates or significantly reduces the threats.

D. If any portion of the identified habitat and buffer cannot be protected in perpetuity, quantify the effects by acres or number of plants and/or animals affected, and protect from development in perpetuity habitat of similar or better quality, on-site or off-site, by donating or selling a conservation easement on it to an accredited land trust or relevant public agency. The donation or easement must cover an amount of land equal to or larger than the area that cannot be protected.

E. If any portion of the identified habitat and buffer cannot be protected in perpetuity, quantify the effects by acres or number of plants and/or animals affected, and protect from development in perpetuity habitat of similar or better quality, on-site or off-site, by donating or selling a conservation easement on it to an accredited land trust or relevant public agency. The donation or easement must cover an amount of land equal to or larger than the area that cannot be protected.

F. If any portion of the identified habitat and buffer cannot be protected in perpetuity, quantify the effects by acres or number of plants and/or animals affected, and protect from development in perpetuity habitat of similar or better quality, on-site or off-site, by donating or selling a conservation easement on it to an accredited land trust or relevant public agency. The donation or easement must cover an amount of land equal to or larger than the area that cannot be protected.
TO CONSERVE NATIVE PLANTS, WILDLIFE HABITAT, WETLANDS, AND WATER BODIES.

Sites without Significant Habitat or Wetlands and Water Bodies
Locate the project on a site that does not have significant habitat, as defined in Option 2 of this credit, or land within 100 feet of such habitat.

Sites with Significant Habitat
Work with both the local Natural Heritage Program and the local fish and wildlife agency to delineate identified significant habitat on the site. Do not disturb significant habitat or portions of the site within an appropriate buffer around the habitat. The geographic extent of the habitat and buffer must be identified by a qualified biologist, a nongovernmental conservation organization, or the appropriate local or regional agency. Protect significant habitat and its identified buffers from development in perpetuity by donating or selling the land, or a conservation easement on the land, to an accredited land trust or relevant public agency (a deed covenant is not sufficient to meet this requirement). Identify and commit to ongoing management activities, along with parties responsible for management and funding available, so that habitat is maintained in preproject condition or better for a minimum of three years after the project is built out.

Significant Habitat for this Credit Includes the Following:
A. Habitat for species that are listed or are candidates for listing under local or federal endangered species acts, habitat for species of special concern in the locality, and/or habitat for those species and/or ecological communities classified as G1, G2, G3, and/or S1 and S2 species by NatureServe.
B. Locally or regionally significant habitat of any size, or patches of predominantly native vegetation at least 150 acres (even if some of the 150 acres lies outside the project boundary).
C. Habitat flagged for conservation under a regional or local conservation or green infrastructure plan.

Sites with Wetlands and Water Bodies
Design the project to conserve 100% of all water bodies, wetlands, and land within 100 feet of water bodies, and land within 50 feet of wetlands on the site. Using a qualified biologist, conduct an assessment, or compile existing assessments, showing the extent to which those water bodies and/wetlands perform the following functions:

(1) Water Quality Maintenance,
(2) Wildlife Habitat Protection, and
(3) Hydrologic Function Maintenance, including flood protection.

Assign appropriate buffers (not less than 100 feet for water bodies and 50 feet for wetlands) based on the functions provided, contiguous soils and slopes, and contiguous land uses. Do not disturb wetlands, water bodies, and their buffers, and protect them from development in perpetuity by donating or selling the land, or a conservation easement on the land, to an accredited land trust or relevant public agency (a deed covenant is not sufficient to meet this requirement).

Identify and commit to ongoing management activities, along with parties responsible for management and funding available, so that habitat is maintained in preproject condition or better for a minimum of three years after the project is built out.

Long-Term Conservation Management of Wetlands and Water Bodies.

The following features are not considered wetlands, water bodies, or buffer land that must be protected:

A. Previously Developed Land.
B. Man-made Water Bodies (such as industrial mining pits, concrete-lined canals, or stormwater retention ponds) that lack natural edges and floors or native ecological communities in the water and along the edge.
C. Man-made Linear Wetlands that result from the interruption of natural drainages by existing rights-of-way.
D. Wetlands that were created incidentally by human activity and have been rated “poor” for all measured wetland functions. Wetland quality assessment must be performed by a qualified biologist using a method that is accepted by local or regional permitting agencies.

CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENADA

[Logo and website URL]
RESTORE NATIVE PLANTS, WILDLIFE HABITAT, WETLANDS, AND WATER BODIES THAT HAVE BEEN HARMED BY PREVIOUS HUMAN ACTIVITIES.

USING ONLY NATIVE PLANTS, RESTORE PREDEVELOPMENT NATIVE ECOLOGICAL COMMUNITIES, WATER BODIES, OR WETLANDS ON THE PROJECT SITE IN AN AREA EQUAL TO OR GREATER THAN 10% OF THE DEVELOPMENT FOOTPRINT. WORK WITH A QUALIFIED BIOLOGIST TO ENSURE THAT RESTORED AREAS WILL HAVE THE NATIVE SPECIES ASSEMBLAGES, HYDROLOGY, AND OTHER HABITAT CHARACTERISTICS THAT LIKELY OCCURRED IN PREDEVELOPMENT CONDITIONS. PROTECT SUCH AREAS FROM DEVELOPMENT IN PERPETUITY BY DONATING OR SELLING THE LAND, OR A CONSERVATION EASEMENT ON THE LAND, TO AN ACCREDITED LAND TRUST OR RELEVANT PUBLIC AGENCY (A DEED COVENANT IS NOT SUFFICIENT TO MEET THIS REQUIREMENT). IDENTIFY AND COMMIT TO ONGOING MANAGEMENT ACTIVITIES, ALONG WITH PARTIES RESPONSIBLE FOR MANAGEMENT AND FUNDING AVAILABLE, SO THAT RESTORED AREAS ARE MAINTAINED FOR A MINIMUM OF THREE YEARS AFTER THE PROJECT IS BUILT OUT OR THE RESTORATION IS COMPLETED, WHICHEVER IS LATER.
Stormwater is a term used to describe water that originates during precipitation events. It may also be used to apply to water that originates with snowmelt or runoff water from overwatering that enters the stormwater system. Stormwater that does not soak into the ground becomes surface runoff, which either flows directly into surface waterways or is channeled into storm sewers, which eventually discharge to surface waters. Stormwater is of concern for two main issues: one related to the volume and timing of runoff water (flood control and water supplies) and the other related to potential contaminants that the water is carrying, i.e. water pollution.

Because impervious surfaces (parking lots, roads, buildings, compacted soil) do not allow rain to infiltrate into the ground, more runoff is generated than in the undeveloped condition. This additional runoff can erode watercourses (streams and rivers) as well as cause flooding when the stormwater collection system is overwhelmed by the additional flow. Because the water is flushed out of the watershed during the storm event, little infiltrates the soil, replenishes groundwater, or supplies stream baseflow in dry weather.

Pollutants entering surface waters during precipitation events is termed polluted runoff. Daily human activities result in deposition of pollutants on roads, lawns, roofs, farm fields, etc. When it rains or there is irrigation, water runs off and ultimately makes its way to a river, lake, or the ocean. While there is some attenuation of these pollutants before entering the receiving waters, the quantity of human activity results in large enough quantities of pollutants to impair these receiving waters.

Managing the quantity and quality of stormwater is termed, “Stormwater Management.” The term Best Management Practice (BMP) is often used to refer to both structural or engineered control devices and systems (e.g. retention ponds) to treat polluted stormwater, as well as operational or procedural practices. There are many forms of stormwater management and BMPs, including:
• Manage stormwater to control flooding and erosion;
• Manage and control hazardous materials to prevent release of pollutants into the environment (source control);
• Plan and construct stormwater systems so contaminants are removed before they pollute surface waters or groundwater resources;
• Acquire and protect natural waterways where they still exist or can be rehabilitated;
• Build “soft” structures such as ponds, swales or wetlands to work with existing or “hard” drainage structures, such as pipes and concrete channels;
• Revise current stormwater regulations to address comprehensive stormwater needs;
• Enhance and enforce existing ordinances to make sure property owners consider the effects of stormwater before, during and after development of their land;
• Educate a community about how its actions affect water quality, and what it can do to improve water quality; and
• Plan carefully to create solutions before problems become too great.

Stormwater Management

Carriacou Free Port
Dumfries, Carriacou, Grenada
REDUCE EFFECTS ON NATURAL WATER RESOURCES AND REDUCE BURDENS ON COMMUNITY WATER SUPPLY AND WASTEWATER SYSTEMS.

FOR NONRESIDENTIAL BUILDINGS, MIXED-USE BUILDINGS, AND MULTIFAMILY RESIDENTIAL BUILDINGS FOUR STORIES OR MORE:


REDUCE WATER CONSUMPTION FOR OUTDOOR LANDSCAPE IRRIGATION BY 50% FROM A CALCULATED MIDSUMMER BASELINE CASE. REDUCTIONS MAY BE ATTRIBUTED TO ANY COMBINATION OF THE FOLLOWING STRATEGIES, AMONG OTHERS:

A. PLANT SPECIES, PLANT DENSITY, AND MICROCLIMATE FACTOR.
B. IRRIGATION EFFICIENCY.
C. USE OF CAPTURED RAINWATER.
D. USE OF RECYCLED WASTEWATER.
E. USE OF WATER TREATED AND CONVEYED BY A PUBLIC AGENCY SPECIFICALLY FOR NONPOTABLE USES.
F. USE OF OTHER NONPOTABLE WATER SOURCES, SUCH AS STORMWATER, AIR-CONDITIONING CONDENSATE, AND FOUNDATION DRAIN WATER. PROJECTS WITH NO NEW OR EXISTING LANDSCAPE IRRIGATION REQUIREMENTS AUTOMATICALLY MEET THE CREDIT REQUIREMENTS.

GROUNDWATER SEEPAGE THAT IS PUMPED AWAY FROM THE IMMEDIATE VICINITY OF BUILDINGS SLABS AND FOUNDATIONS CAN BE USED FOR LANDSCAPE IRRIGATION AND MEET THE INTENT OF THIS CREDIT. HOWEVER, IT MUST BE DEMONSTRATED THAT DOING SO DOES NOT AFFECT SITE STORMWATER MANAGEMENT SYSTEMS.

THE GOALS OF WATER CONSERVATION EFFORTS INCLUDE AS FOLLOWS:

SUSTAINABILITY. TO ENSURE AVAILABILITY FOR FUTURE GENERATIONS, THE WITHDRAWAL OF FRESH WATER FROM AN ECOSYSTEM SHOULD NOT EXCEED ITS NATURAL REPLACEMENT RATE.

ENERGY CONSERVATION. WATER PUMPING, DELIVERY, AND WASTEWATER TREATMENT FACILITIES CONSUME A SIGNIFICANT AMOUNT OF ENERGY. IN SOME REGIONS OF THE WORLD (FOR EXAMPLE, CALIFORNIA) OVER 15% OF TOTAL ELECTRICITY CONSUMPTION IS DEVOTED TO WATER MANAGEMENT.

HABITAT CONSERVATION. MINIMIZING HUMAN WATER USE HELPS TO PRESERVE FRESH WATER HABITATS FOR LOCAL WILDLIFE AND MIGRATING WATERFOWL, AS WELL AS REDUCING THE NEED TO BUILD NEW DAMS AND OTHER WATER DIVERSION INFRASTRUCTURE.

WATER CONSERVATION REFERS TO REDUCING THE USAGE OF WATER AND RECYCLING OF WASTE WATER FOR DIFFERENT PURPOSES SUCH AS CLEANING, MANUFACTURING, AND AGRICULTURAL IRRIGATION.
Urban sprawl, also known as suburban sprawl, is a multifaceted concept, which includes the spreading outwards of a city and its suburbs to its outskirts to low-density and auto-dependent development on rural land, high segregation of uses (e.g. stores and residential), and various design features that encourage car dependency. As a result, some critics argue that sprawl has certain disadvantages, including:

- High car dependence.
- Inadequate facilities e.g.: cultural, emergency, health, etc.
- Higher per-person infrastructure costs.
- Inefficient street layouts.
- Low diversity of housing and business types.
- Higher per-capita use of energy, land, and water.
- Perceived low aesthetic value.

To encourage development within existing cities, suburbs, and towns to reduce adverse environmental and public health effects associated with sprawl, to reduce development pressure beyond the limits of existing development, to conserve natural and financial resources required for construction and maintenance of infrastructure.
A transit-oriented development (TOD) is a mixed-use residential or commercial area designed to maximize access to public transport, and often incorporates features to encourage transit ridership. A TOD neighborhood typically has a center with a transit station or stop (train station, metro station, tram stop, or bus stop), surrounded by relatively high-density development with progressively lower-density development spreading outwards from the center. TODs generally are located within a radius of one-quarter to one-half mile (400 to 800 m) from a transit stop, as this is considered to be an appropriate scale for pedestrians.

Encourage development in locations shown to have multimodal transportation choices or otherwise reduced motor vehicle use, thereby reducing greenhouse gas emissions, air pollution, and other adverse environmental and public health effects associated with motor vehicle use.

Locate the project on a site with existing VV service such that at least 50% of dwelling units and nonresidential building entrances (inclusive of existing buildings) are within a 1/4-mile walk distance of bus or streetcar stops, or within a 1/2-mile walk distance of bus rapid transit stops, light or heavy rail stations, or ferry terminals, and the transit service at those stops in aggregate meet the minimums listed in Tables 1 and 2. Both weekday and weekend trip minimums must be met to earn points at a particular threshold. Projects larger than 125 acres can meet the requirements by locating on a site with existing transit service such that at least 40% of dwelling units and nonresidential building entrances (inclusive of existing buildings) are within a 1/4-mile walk distance of bus or streetcar stops, or within a 1/2-mile walk distance of bus rapid transit stops, light or heavy rail stations, or ferry terminals, and the transit service at those stops in aggregate meet the minimums listed in Tables 1 and 2 (both weekday and weekend trip minimums must be met to earn points at a particular threshold), as long as the 40% complies with NPD Prerequisite 2 and any portion of the project beyond the 1/4-mile and/or 1/2-mile walk distances meets SLL Prerequisite 1, Option 3-compliant planned transit service. Projects greater than 500 acres can meet the requirements by locating on a site with existing transit service such that at least 30% of dwelling units and nonresidential building entrances (inclusive of existing buildings) are within a 1/4-mile walk distance of bus or streetcar stops, or within a 1/2-mile walk distance of bus rapid transit stops, light or heavy rail stations, or ferry terminals, and the transit service at those stops in aggregate meet the minimums listed in Tables 1 and 2 (both weekday and weekend trip minimums must be met to earn points at a particular threshold), as long as the 30% complies with NPD Prerequisite 2 and any portion of the project beyond the 1/4-mile and/or 1/2-mile walk distances meets SLL Prerequisite 1, Option 3-compliant planned transit service. For all projects, weekend daily trips must include service on both Saturday and Sunday. Commuter rail must serve more than one metropolitan statistical area (MSA) and/or the area surrounding the core of an MSA.

Metropolitan Planning Organization Location with Low VMT
Locate the project within a region served by a metropolitan planning organization (MPO) and within a transportation analysis zone where the current annual home-based vehicle miles traveled (VMT) per capita does not exceed 90% of the average of the metropolitan region. The research must be derived from household transportation surveys conducted by the MPO within ten years of the date of submission for LEED for Neighborhood Development certification.
TO PROMOTE BICYCLING AND TRANSPORTATION EFFICIENCY, INCLUDING REDUCED VEHICLE MILES TRAVELED (VMT). TO SUPPORT PUBLIC HEALTH BY ENCOURAGING UTILITARIAN AND RECREATIONAL PHYSICAL ACTIVITY.

BICYCLE NETWORK
Design and/or locate the project to meet at least one of the three requirements below:

a. An existing bicycle network of at least 5 continuous miles in length is within 1/4-mile bicycling distance of the project boundary.
b. If the project is 100% residential, an existing bicycle network begins within 1/4-mile bicycling distance of the project boundary and connects to a school or employment center within 3 miles’ bicycling distance.
c. An existing bicycle network within 1/4-mile bicycling distance of the project boundary connects to at least ten diverse uses (see Appendix) within 3 miles’ bicycling distance from the project boundary.

BICYCLE STORAGE
Provide bicycle parking and storage capacity to new buildings as follows:

a. Multifamily residential. Provide at least one secure, enclosed bicycle storage space per occupant for 30% of the planned occupancy but no fewer than one per unit. Provide secure visitor bicycle racks on-site, with at least one bicycle space per ten dwelling units but no fewer than four spaces per project site.
b. Retail. Provide at least one secure, enclosed bicycle storage space per new retail worker for 10% of retail worker planned occupancy. Provide visitor or customer bicycle racks on-site, with at least one bicycle space per 5,000 square feet of retail space, but no fewer than one bicycle space per business or four bicycle spaces per project site, whichever is greater. Provide at least one on-site shower with changing facility for any development with 100 or more new workers and at least one additional on-site shower with changing facility for every 150 new workers thereafter.
c. Nonresidential other than retail. Provide at least one secure, enclosed bicycle storage space per new occupant for 10% of planned occupancy. Provide visitor bicycle racks on-site with at least one bicycle space per 10,000 square feet of new commercial nonretail space but not fewer than four bicycle spaces per building. Provide at least one on-site shower with changing facility for any development with 100 or more new workers and at least one additional on-site shower with changing facility for every 150 new workers thereafter.

Secure, enclosed bicycle storage areas must be locked and easily accessible to residents and/or workers. Provide informational signage on using the storage facilities.

Visitors’ and customers’ bicycle racks must be clearly visible from a main entry, located within 100 feet of the door, served with night lighting, and protected from damage from nearby vehicles. If the building has multiple main entries, bicycle racks must be proportionally dispersed within 100 feet of each.

Shower and changing facility requirements may be met by providing the equivalent of free access to on-site health club shower facilities, if the health club can be accessed without going outside. Provide informational signage on using the shower facilities.

CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENADE
PROMOTE TRANSPORTATION EFFICIENCY, INCLUDING REDUCED VEHICLE MILES TRAVELED (VMT). TO PROMOTE WALKING BY PROVIDING SAFE, APPEALING, AND COMFORTABLE STREET ENVIRONMENTS THAT SUPPORT PUBLIC HEALTH BY REDUCING PEDESTRIAN INJURIES AND ENCOURAGING DAILY PHYSICAL ACTIVITY.

DESIGN AND BUILD THE PROJECT TO ACHIEVE ALL OF THE FOLLOWING:

A. FOR 90% OF NEW BUILDING FRONTAGE, A PRINCIPAL FUNCTIONAL ENTRY ON THE FRONT FAÇADE FACES A PUBLIC SPACE, SUCH AS A STREET, SQUARE, PARK, PASEO, OR PLAZA, BUT NOT A PARKING LOT, AND IS CONNECTED TO SIDEWALKS OR EQUIVALENT PROVISIONS FOR WALKING. THE SQUARE, PARK, OR PLAZA MUST BE AT LEAST 50 FEET WIDE AT A POINT PERPENDICULAR TO EACH ENTRY.

B. AT LEAST 15% OF EXISTING AND NEW STREET FRONTAGE WITHIN AND BORDERING THE PROJECT HAS A MINIMUM BUILDING-HEIGHT-TO-STREET-WIDTH RATIO OF 1:3 (I.E., A MINIMUM OF 1 FOOT OF BUILDING HEIGHT FOR EVERY 3 FEET OF STREET WIDTH).
   - Nonmotorized rights-of-way may be counted toward the 15% requirement, but 100% of such spaces must have a minimum building-height-to-street-width ratio of 1:1.
   - Projects with bordering street frontage must meet only their proportional share of the height-to-width ratio (i.e., only on the project side of the street).
   - Street frontage is measured in linear feet.
   - Building height is measured to eaves or the top of the roof for a flat-roof structure, and street width is measured façade to façade. For block frontages with multiple heights and/or widths, use average heights or widths weighted by each segment’s linear share of the total block distance.
   - Alleys and driveways are excluded.

C. CONTINUOUS SIDEWALKS OR EQUIVALENT ALL-WEATHER PROVISIONS FOR WALKING ARE PROVIDED ALONG BOTH SIDES OF 90% OF STREETS OR FRONTAGE WITHIN THE PROJECT, INCLUDING THE PROJECT SIDE OF STREETS BORDERING THE PROJECT. NEW SIDEWALKS, WHETHER ADJACENT TO STREETS OR NOT, MUST BE AT LEAST 8 FEET WIDE ON RETAIL OR MIXED-USE BLOCKS AND AT LEAST 4 FEET WIDE ON ALL OTHER BLOCKS. EQUIVALENT PROVISIONS FOR WALKING INCLUDE WOONERFS AND ALL-WEATHER-SURFACE FOOTPATHS. ALLEYS, DRIVEWAYS, AND RECONSTRUCTED EXISTING SIDEWALKS ARE EXCLUDED FROM THESE CALCULATIONS.

D. NO MORE THAN 20% OF THE STREET FRONTAGES WITHIN THE PROJECT ARE FACED DIRECTLY BY GARAGE AND SERVICE BAY OPENINGS.

PROJECTS IN A DESIGNATED HISTORIC DISTRICT SUBJECT TO REVIEW BY A LOCAL HISTORIC PRESERVATION ENTITY ARE EXEMPT FROM (B), (C), AND (D) IF APPROVAL FOR COMPLIANCE IS NOT GRANTED BY THE REVIEW BODY. PROJECTS IN HISTORIC DISTRICTS LISTED IN OR ELIGIBLE FOR LISTING IN A LOCAL REGISTER OR THE NATIONAL REGISTER OF HISTORIC PLACES THAT ARE SUBJECT TO REVIEW BY A LOCAL HISTORIC PRESERVATION OFFICE OR THE NATIONAL PARK SERVICE ARE EXEMPT FROM (B), (C), AND (D) IF APPROVAL FOR COMPLIANCE IS NOT GRANTED.
PROGRESS SET

ENCOURAGE BALANCED COMMUNITIES WITH A DIVERSITY OF USES AND EMPLOYMENT OPPORTUNITIES.

PROJECT WITH AFFORDABLE RESIDENTIAL COMPONENT
INCLUDE A RESIDENTIAL COMPONENT EQUALING AT LEAST 30% OF THE PROJECT’S TOTAL BUILDING SQUARE FOOTAGE (EXCLUSIVE OF PARKING STRUCTURES), AND LOCATE AND/OR DESIGN THE PROJECT SUCH THAT THE GEOGRAPHIC CENTER (OR BOUNDARY IF THE PROJECT EXCEEDS 500 ACRES) IS WITHIN 1/2-MILE WALK DISTANCE OF EXISTING FULL-TIME-EQUIVALENT JOBS WHOSE NUMBER IS EQUAL TO OR GREATER THAN THE NUMBER OF DWELLING UNITS IN THE PROJECT; AND SATISFY THE REQUIREMENTS NECESSARY TO EARN AT LEAST ONE POINT UNDER NPD CREDIT 4, MIXED-INCOME DIVERSE COMMUNITIES, OPTION 2, AFFORDABLE HOUSING.

PROJECT WITH RESIDENTIAL COMPONENT
INCLUDE A RESIDENTIAL COMPONENT EQUALING AT LEAST 30% OF THE PROJECT’S TOTAL BUILDING SQUARE FOOTAGE (EXCLUSIVE OF PARKING STRUCTURES), AND LOCATE AND/OR DESIGN THE PROJECT SUCH THAT THE GEOGRAPHIC CENTER (OR BOUNDARY IF THE PROJECT EXCEEDS 500 ACRES) IS WITHIN 1/2-MILE WALK DISTANCE OF EXISTING FULL-TIME-EQUIVALENT JOBS WHOSE NUMBER IS EQUAL TO OR GREATER THAN THE NUMBER OF DWELLING UNITS IN THE PROJECT.

INFILL PROJECT WITH NONRESIDENTIAL COMPONENT
INCLUDE A NONRESIDENTIAL COMPONENT EQUALING AT LEAST 30% OF THE PROJECT’S TOTAL BUILDING SQUARE FOOTAGE (EXCLUSIVE OF PARKING STRUCTURES), AND LOCATE ON AN INFILL SITE WHOSE GEOGRAPHIC CENTER (OR BOUNDARY IF THE PROJECT EXCEEDS 500 ACRES) IS WITHIN 1/2-MILE WALK DISTANCE OF AN EXISTING RAIL TRANSIT, FERRY, OR TRAM STOP AND WITHIN 1/2-MILE WALK DISTANCE OF EXISTING DWELLING UNITS WHOSE NUMBER IS EQUAL TO OR GREATER THAN 50% OF THE NUMBER OF NEW FULL-TIME-EQUIVALENT JOBS CREATED AS PART OF THE PROJECT.

DIVERSE COMMUNITIES
To promote projects that have high levels of internal connectivity and are well connected to the community at large. To encourage development within existing communities, thereby conserving land and promoting multimodal transportation. To improve public health by encouraging daily physical activity and reducing the negative effects of motor vehicle emissions.

Design and/or locate the project such that a through-street and/or nonmotorized right-of-way intersects or terminates at the project boundary at least every 400 feet or at existing abutting street intervals and intersections, whichever is the shorter distance. Include a pedestrian or bicycle through-connection in at least 90% of any new cul-de-sac. This does not apply to portions of the boundary where connections cannot be made because of physical obstacles, such as prior platting of property, construction of existing buildings or other barriers, slopes over 15%, wetlands and water bodies, railroad and utility rights-of-way, existing limited-access motor vehicle rights-of-way, and parks and dedicated open space.
To encourage transit use and reduce driving by providing safe, convenient, and comfortable transit waiting areas and safe and secure bicycle storage facilities for transit users.

Work with the transit agency or agencies serving the project to identify transit stop locations within and/or bordering the project boundary where transit agency-approved shelters and any other agency-required improvements, including bicycle racks, will be installed no later than construction of 50% of total project square footage. At those locations, install approved shelters and any required improvements, or provide funding to the transit agency for their installation. Shelters must be covered, be at least partially enclosed to buffer wind and rain, and have seating and illumination. Any required bicycle racks must have a two-point support system for locking the frame and wheels and be securely affixed to the ground or a building.

Work with the transit agency or agencies serving the project to identify locations within and bordering the project boundary where the agency determines that transit stops will be warranted within two years of project completion, either because of increased ridership on existing service resulting from the project or because of planned future transit. At those locations, reserve space for transit shelters and any required improvements, including bicycle racks. In lieu of or in addition to new stops, this requirement can be satisfied with a commitment from the transit agency to provide increased service to the transit stops that will have been installed at the time of 50% build-out.

Work with the transit agency or agencies serving the project to provide kiosks, bulletin boards, and/or signs that display transit schedules and route information at each public transit stop within and bordering the project.
To cluster diverse land uses in accessible neighborhood and regional centers to encourage daily walking, biking, and transit use, reduce vehicle miles traveled (VMT) and automobile dependence, and support car-free living.

For all projects
Locate and/or design the project such that 50% of its dwelling units are within a 1/4-mile walk distance of the number of diverse uses (see Appendix) in Table 1, including at least one use from each of the four categories. For projects with no dwellings, 50% of dwelling units within 1/4 mile of the project boundary must be within a 1/4-mile walk distance of the number of diverse uses specified in Table 1, including at least one food retail store and at least one establishment from each of two other categories. Establishments may be inside or outside the project and may be existing or planned diverse uses.

The specified number of diverse uses must be in place by the time of occupancy according to the percentages indicated in Table 1 (exclusive of portions of parking structures devoted to parking):

Table 1. Points for diverse uses within 1/4-mile walk distance, by time of occupancy

<table>
<thead>
<tr>
<th>Diverse uses</th>
<th>Percentage occupancy of total square footage</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>4–6</td>
<td>20%</td>
<td>1</td>
</tr>
<tr>
<td>7–10</td>
<td>30%</td>
<td>2</td>
</tr>
<tr>
<td>11–18</td>
<td>40%</td>
<td>3</td>
</tr>
<tr>
<td>≥ 19</td>
<td>50%</td>
<td>4</td>
</tr>
</tbody>
</table>

For neighborhood center, the following restrictions apply:

1. A single establishment may not be counted in two categories (e.g., a place of worship may be counted only once even if it also contains a daycare facility, and a retail store may be counted only once even if it sells products in several categories or as two types of diverse use).

2. Establishments in a mixed-use building may each count if they are distinctly operated enterprises with separate exterior entrances, but no more than half of the minimum number of diverse uses can be situated in a single building or under a common roof.

3. Only two establishments of a single type may be counted (e.g., if five restaurants are within the required distance, only two may be counted).

AUTOMOBILE DEPENDENCY REDUCTION
To design parking to increase the pedestrian orientation of projects and minimize the adverse environmental effects of parking facilities, to reduce public health risks by encouraging daily physical activity associated with walking and bicycling.

For new nonresidential buildings and multiunit residential buildings, either do not build new off-street parking lots, or locate all new off-street surface parking lots at the side or rear of buildings, leaving building frontages facing streets free of surface parking lots.

Use no more than 20% of the total development footprint area for all new off-street surface parking facilities, with no individual surface parking lot larger than 2 acres. For the purposes of this credit, surface parking facilities include ground-level garages unless they are under habitable building space. Underground or multistory parking facilities can be used to provide additional capacity, and on-street parking spaces are exempt from this limitation.

Provide bicycle parking and storage capacity to new buildings as follows:

A. Multiunit residential. Provide at least one secure, enclosed bicycle storage space per occupant for 30% of the planned occupancy but no fewer than one per unit. Provide secure visitor bicycle racks on-site, with at least one bicycle space per ten dwelling units but no fewer than four spaces per project site.

B. Retail. Provide at least one secure, enclosed bicycle storage space per new retail worker for 10% of retail worker planned occupancy. Provide visitor or customer bicycle racks on-site, with at least one bicycle space per 5,000 square feet of retail space, but no fewer than one bicycle space per business or four bicycle spaces per project site, whichever is greater. Provide at least one on-site shower with changing facility for any development with 100 or more new workers and at least one additional on-site shower with changing facility for every 150 new workers thereafter.

C. Nonresidential other than retail. Provide at least one secure, enclosed bicycle storage space per new occupant for 10% of planned occupancy. Provide visitor bicycle racks on-site with at least one bicycle space per 10,000 square feet of new commercial nonretail space but not fewer than four bicycle spaces per building. Provide at least one on-site shower with changing facility for any development with 100 or more new workers and at least one additional on-site shower with changing facility for every 150 new workers thereafter. Secure, enclosed bicycle storage areas must be locked and easily accessible to residents and/or workers. Provide informational signage on using the storage facilities. Visitors’ and customers’ bicycle racks must be clearly visible from a main entry, located within 100 feet of the door, served with night lighting, and protected from damage from nearby vehicles. If the building has multiple main entries, bicycle racks must be proportionally dispersed within 100 feet of each. Shower and changing facility requirements may be met by providing the equivalent of free access to on-site health club shower facilities, if the health club can be accessed without going outside. Provide informational signage on using the shower facilities.

Provide carpool and/or shared-use vehicle parking spaces equivalent to 10% of the total automobile parking for each nonresidential and mixed-use building on the site. Signage indicating such parking spots must be provided, and the parking spots must be within 200 feet of entrances to the buildings served.
TO IMPROVE PHYSICAL AND MENTAL HEALTH AND SOCIAL CAPITAL BY PROVIDING A VARIETY OF OPEN SPACES CLOSE TO WORK AND HOME TO FACILITATE SOCIAL NETWORKING, CIVIC ENGAGEMENT, PHYSICAL ACTIVITY, AND TIME SPENT OUTDOORS.

LOCATE AND/OR DESIGN THE PROJECT SUCH THAT A CIVIC OR PASSIVE-USE SPACE, SUCH AS A SQUARE, PARK, PASEO, OR PLAZA, AT LEAST 1/6 ACRE IN AREA LIES WITHIN A 1/4-MILE WALK DISTANCE OF 90% OF PLANNED AND EXISTING DWELLING UNITS AND NONRESIDENTIAL BUILDING ENTRANCES. SPACES LESS THAN 1 ACRE MUST HAVE A PROPORTION NO NARROWER THAN 1 UNIT OF WIDTH TO 4 UNITS OF LENGTH.

FOR PROJECTS LARGER THAN 7 ACRES, LOCATE AND/OR DESIGN THE PROJECT SUCH THAT THE MEDIAN SIZE OF CIVIC OR PASSIVE-USE SPACES WITHIN AND/OR CONTIGUOUS TO THE PROJECT IS AT LEAST 1/2 ACRE.
To improve physical and mental health and social capital by providing a variety of recreational facilities close to work and home to facilitate physical activity and social networking.

Locate and/or design the project so that a publicly accessible outdoor recreation facility at least 1 acre in area, or a publicly accessible indoor recreational facility of at least 25,000 square feet, lies within a 1/2-mile walk distance of 90% of new and existing dwelling units and nonresidential building entrances. Outdoor recreation facilities must consist of physical improvements and may include “tot lots,” swimming pools, and sports fields, such as baseball diamonds.
Progress set promote community-based food production, improve nutrition through increased access to fresh produce, support preservation of small farms producing a wide variety of crops, reduce the negative environmental effects of large-scale industrialized agriculture, and support local economic development that increases the economic value and production of farmlands and community gardens.

Establish covenants, conditions, and restrictions (CC&R) or other forms of deed restrictions that do not prohibit the growing of produce in project areas, including greenhouses, any portion of residential front, rear, or side yards; or balconies, patios, or rooftops. Greenhouses but not gardens may be prohibited in front yards that face the street.

Neighborhood Farms and Gardens
Dedicate permanent and viable growing space and/or related facilities (such as greenhouses) within the project according to the square footage areas specified in Table 1 (exclusive of existing dwellings). Provide solar access, fencing, watering systems, garden bed enhancements (such as raised beds), secure storage space for tools, and pedestrian access for these spaces. Ensure that the spaces are owned and managed by an entity that includes occupants of the project in its decision making, such as a community group, homeowners’ association, or public body.

Community-Supported Agriculture
Purch as share s in a community-supported agriculture (CSA) program located within 150 miles of the project site for at least 80% of dwelling units within the project (exclusive of existing dwelling units) for two years, beginning with each dwelling unit’s occupancy until the 80% threshold is reached. Shares must be delivered to a point within 1/2 mile of the project’s geographic center on a regular schedule not less than twice per month at least four months of the year.

Proximity To Farmers’ Market
Locate the project’s geographic center within a 1/2-mile walk distance of an existing or planned farmers’ market that is open or will operate at least once weekly for at least five months annually. Farmers’ market vendors may sell only items grown within 150 miles of the project site. A planned farmers’ market must have firm commitments from farmers and vendors that the market will meet all the above requirements and be in full operation by the time of 50% occupancy of the project’s total square footage.

LOCAL ECONOMIES

CARRIACOU FREE PORT
DUMFRIES, CARRIACOU, GRENADE

WWW.KOBKAR.P.COM

102
ENCOURAGE WALKING, BICYCLING, AND TRANSIT USE AND DISCOURAGE EXCESSIVE MOTORIZATION. TO REDUCE URBAN HEAT, ISLAND EFFECTS, IMPROVE AIR QUALITY, INCREASE EVAPORATION, AND REDUCE COOLING LOADS IN BUILDINGS.

Tree-Lined Streets
Design and build the project to provide street trees on both sides of at least 60% of new and existing streets within the project and on the project side of bordering streets, between the vehicle travel way and walkway, at intervals averaging no more than 40 feet (excluding driveways and utility vaults).

Shaded Street
Trees or other structures provide shade over at least 40% of the length of sidewalks on streets within or contiguous to the project. Trees must provide shade within ten years of landscape installation. Use the estimated crown diameter (the width of the shade if the sun is directly above the tree) to calculate the shaded area.

Obtain a registered landscape architect’s determination that planting details are appropriate to growing healthy trees, taking into account tree species, root medium, and width and soil volume of planter strips or wells, and that the selected tree species are not considered invasive in the project context according to USDA or the local agricultural extension service.
ENCOURAGE THE DESIGN AND CONSTRUCTION OF ENERGY-EFFICIENT BUILDINGS THAT REDUCE AIR, WATER, AND LAND POLLUTION AND ADVERSE ENVIRONMENTAL EFFECTS FROM ENERGY PRODUCTION AND CONSUMPTION.

THE FOLLOWING REQUIREMENT APPLIES TO 90% OF THE BUILDING FLOOR AREA (ROUNDED UP TO THE NEXT WHOLE BUILDING) OF ALL NONRESIDENTIAL BUILDINGS, MIXED-USE BUILDINGS, AND MULTILUNIT RESIDENTIAL BUILDINGS FOUR STORIES OR MORE CONSTRUCTED AS PART OF THE PROJECT OR UNDERGOING MAJOR RENOVATIONS AS PART OF THE PROJECT.


PROJECTS MUST DOCUMENT BUILDING ENERGY EFFICIENCY USING ONE OR A COMBINATION OF THE FOLLOWING:


B. COMPLY WITH THE PRESCRIPTIVE MEASURES OF THE ASHRAE ADVANCED ENERGY DESIGN GUIDE LISTED BELOW, APPROPRIATE TO EACH BUILDING’S SCOPE. COMPLY WITH ALL APPLICABLE CRITERIA AS ESTABLISHED IN THE GUIDE FOR THE CLIMATE ZONE IN WHICH THE PROJECT IS LOCATED.

-ASHRAE ADVANCED ENERGY DESIGN GUIDE FOR SMALL OFFICE BUILDINGS 2004 (OFFICE OCCUPANCY BUILDINGS LESS THAN 20,000 SQUARE FEET).
-ASHRAE ADVANCED ENERGY DESIGN GUIDE FOR SMALL RETAIL BUILDINGS 2006 (RETAIL OCCUPANCY BUILDINGS LESS THAN 20,000 SQUARE FEET).
-ASHRAE ADVANCED ENERGY DESIGN GUIDE FOR SMALL WAREHOUSES AND SELF-STORAGE BUILDINGS 2008 (WAREHOUSE OR SELF-STORAGE OCCUPANCY LESS THAN 50,000 SQUARE FEET).
-ASHRAE ADVANCED ENERGY DESIGN GUIDE FOR K–12 SCHOOL BUILDINGS (K–12 SCHOOL OCCUPANCY LESS THAN 200,000 SQUARE FEET).

C. FOR BUILDINGS LESS THAN 100,000 SQUARE FEET, COMPLY WITH THE PRESCRIPTIVE MEASURES IDENTIFIED IN THE ADVANCED BUILDINGS™ CORE PERFORMANCE™ GUIDE DEVELOPED BY THE NEW BUILDINGS INSTITUTE, AS FOLLOWS:

-COMPLY WITH SECTION 1, DESIGN PROCESS STRATEGIES, AND SECTION 2, CORE PERFORMANCE REQUIREMENTS, OF THE CORE PERFORMANCE GUIDE.

-HEALTH CARE, WAREHOUSE AND LABORATORY PROJECTS ARE INELIGIBLE FOR THIS PATH.
ENCOURAGE THE DESIGN AND CONSTRUCTION OF ENERGY-EFFICIENT BUILDINGS THAT REDUCE AIR, WATER, AND LAND POLLUTION AND ADVERSE ENVIRONMENTAL EFFECTS FROM ENERGY PRODUCTION AND CONSUMPTION.

THE FOLLOWING REQUIREMENT APPLIES TO 90% OF THE BUILDING FLOOR AREA (ROUNDED UP TO THE NEXT WHOLE BUILDING) OF ALL NONRESIDENTIAL BUILDINGS, MIXED-USE BUILDINGS, AND MULTUNIT RESIDENTIAL BUILDINGS FOUR STORIES OR MORE CONSTRUCTED AS PART OF THE PROJECT OR UNDERGOING MAJOR RENOVATIONS AS PART OF THE PROJECT.

NEW BUILDINGS MUST DEMONSTRATE AN AVERAGE 18% (1 POINT) OR 26% (2 POINTS) IMPROVEMENT OVER ANSI/ASHRAE/IESNA STANDARD 90.1–2007 (WITH ERRATA BUT WITHOUT ADDENDA). BUILDINGS UNDERGOING MAJOR RENOVATIONS AS PART OF THE PROJECT MUST DEMONSTRATE AN AVERAGE 14% (1 POINT) OR 22% (2 POINTS) IMPROVEMENT OVER ANSI/ASHRAE/IESNA STANDARD 90.1–2007.

PROJECTS MUST DOCUMENT BUILDING ENERGY EFFICIENCY USING ONE OR A COMBINATION OF THE FOLLOWING:


B. COMPLY WITH THE PRESCRIPTIVE MEASURES OF THE ASHRAE ADVANCED ENERGY DESIGN GUIDE LISTED BELOW, APPROPRIATE TO EACH BUILDING’S SCOPE. COMPLY WITH ALL APPLICABLE CRITERIA AS ESTABLISHED IN THE GUIDE FOR THE CLIMATE ZONE IN WHICH THE PROJECT IS LOCATED.

-ASHRAE ADVANCED ENERGY DESIGN GUIDE FOR SMALL OFFICE BUILDINGS 2004 (OFFICE OCCUPANCY BUILDINGS LESS THAN 20,000 SQUARE FEET).
-ASHRAE ADVANCED ENERGY DESIGN GUIDE FOR SMALL RETAIL BUILDINGS 2006 (RETAIL OCCUPANCY BUILDINGS LESS THAN 20,000 SQUARE FEET).
-ASHRAE ADVANCED ENERGY DESIGN GUIDE FOR SMALL WAREHOUSES AND SELF-STORAGE BUILDINGS 2008 (WAREHOUSE OR SELF-STORAGE OCCUPANCY LESS THAN 50,000 SQUARE FEET).

C. FOR BUILDINGS LESS THAN 100,000 SQUARE FEET, COMPLY WITH THE PRESCRIPTIVE MEASURES IDENTIFIED IN THE ADVANCED BUILDINGS™ CORE PERFORMANCE™ GUIDE DEVELOPED BY THE NEW BUILDINGS INSTITUTE, AS FOLLOWS:

-COMPLY WITH SECTION 1, DESIGN PROCESS STRATEGIES, AND SECTION 2, CORE PERFORMANCE REQUIREMENTS, OF THE CORE PERFORMANCE GUIDE.

-HEALTH CARE, WAREHOUSE AND LABORATORY PROJECTS ARE INELIGIBLE FOR THIS PATH.
To reduce energy consumption, pollution from motor vehicles, and adverse public health effects by encouraging multimodal travel.

Earn one point for every two options achieved below, for a maximum of two points. For the purposes of this credit, existing buildings and their occupants are exempt from the requirements.

TDM Program
Create and implement a comprehensive transportation demand management (TDM) program for the project that reduces weekday peak-period motor vehicle trips by at least 20% compared with a baseline case, and fund the program for a minimum of three years following build-out of the project. The TDM program must be prepared by qualified transportation professionals.

Transit Passes
Provide transit passes valid for at least one year, subsidized to be half of regular price or cheaper, to each occupant locating within the project during the first three years of project occupancy (or longer). Publicize the availability of subsidized transit passes are available to project occupants;

Developer-Sponsored Transit
Provide year-round, developer-sponsored private transit service (with vans, shuttles, buses) from at least one central point in the project to other major transit facilities, and/or other destinations such as a retail or employment center, with service no less frequent than 45 daily weekday trips and 30 daily weekend trips. The service must begin by the time the project total square footage is 20% occupied and must be guaranteed for at least three years beyond project build-out. Twenty percent occupancy is defined as residents living in 20% of the project total square footage.

Provide transit stop shelters and bicycle racks adequate to meet projected demand but no less than one shelter and one bicycle rack at each transit stop. Shelters must be covered, be at least partially enclosed to buffer wind and rain, and have seating and illumination. Bicycle racks must have a two-point support system for locking the frame and wheels and must be securely affixed to the ground or a building. OR

Vehicle Sharing
Locate the project such that 50% of the dwelling units and nonresidential building entrances are within a ¼ mile walk distance of at least one vehicle in a vehicle-sharing program. For each vehicle, dedicate one parking space accessible to vehicle-sharing members. Through signage and other means, publicize to project occupants the availability and benefits of the vehicle-sharing program. If the project has more than 100 dwelling units and/or employees and has a minimum transit service of 60 daily weekday trips and 40 daily weekend trips, at least one additional vehicle and parking space for every 100 dwelling units and/or employees must be available. If the project has more than 100 dwelling units and/or employees but does not have transit service at the frequencies specified above, at least one additional vehicle and parking space for every 200 dwelling units and/or employees must be available. Where new vehicle locations are created, a vehicle sharing program must begin by the time the project total square footage is 20% occupied; commit to providing vehicles to the locations for at least two years. Twenty percent occupancy is defined as residents living in 20% of the project dwelling units and/or employees working in 20% of the total nonresidential square footage of the project.

Unbundling of Parking
For 90% of multiunit residential units and/or nonresidential square footage, the associated parking-spaces are sold or rented separately from the dwelling units and/or nonresidential square footage.
To encourage the design, construction, and retrofit of buildings that utilize green building practices.

Projects with 10 or Fewer Habitable Buildings

Design, construct, or retrofit one building as part of the project, beyond the prerequisite, to be certified under one of the following LEED green building rating systems: LEED for New Construction, LEED for Existing Buildings, LEED for Homes, LEED for Schools, LEED for Retail: New Construction, or LEED for Core & Shell (with at least 75% of the floor area certified under LEED for Commercial Interiors or LEED for Retail: Commercial Interiors) or through a green building rating system requiring review by independent, impartial, third-party certifying bodies as defined by ISO/IEC 17021. Additional points (up to 5) may be earned for each additional certified building that is part of the project.
**INTENT**

To extend the life cycle of existing building stock to conserve resources, reduce waste, and reduce adverse environmental effects of new buildings related to materials manufacturing and transport.

Reuse the existing habitable building stock, achieving the greater of the following two benchmarks (based on surface area):

- A. 50% of one existing building structure (including structural floor and roof decking) and envelope (including exterior skin and framing but excluding window assemblies and nonstructural roofing material).
- B. 20% of the total existing building stock (including structure and envelope, as defined above).

Hazardous materials that are remediated as a part of the project scope must be excluded from the calculations.

Do not demolish any historic buildings, or portions thereof, or alter any cultural landscapes as part of the project. An exception is granted only if such action has been approved by an appropriate review body. For buildings listed locally, approval must be granted by the local historic preservation review board, or equivalent. For buildings listed in a local register or in the National Register of Historic Places, approval must appear in a programmatic agreement with the State Historic Preservation Office.

---

**CULTURAL PRESERVATION & RESTORATION**

**CARRIACOU FREE PORT**

DUMFRIES, CARRIACOU, GRENADA

---

**URBANIZA**
To encourage the preservation and adaptive use of historic buildings and cultural landscapes that represent significant embodied energy and cultural value, in a manner that preserves historic materials and character-defining features.

To achieve this credit, at least one historic building or cultural landscape must be present on the project site. Do not demolish any historic buildings, or portions thereof, or alter any cultural landscapes as part of the project. An exception is granted only if such action has been approved by an appropriate review body. For buildings or landscapes listed locally, approval must be granted by the local historic preservation review board, or equivalent. For buildings or landscapes listed in a local register or in the National Register of Historic Places, approval must appear in a programmatic agreement with the State Historic Preservation Office.

If any historic building in the project site is to be rehabilitated, rehabilitate in accordance with local review or federal standards for rehabilitation, whichever is more restrictive, using one of the following approaches:

A. Obtain approval, in the form of a “Certificate of Appropriateness,” from a locally appointed historic preservation commission or architectural review board for any exterior alterations or additions.
B. If federal funds are used for the project, obtain confirmation from a local historic preservation office or the National Park Service that the rehabilitation satisfies the Secretary of the Interior’s Standards for Rehabilitation.
C. If a building or site is listed in or determined eligible for the National Register of Historic Places but is not subject to federal or local review board review, include on the project team a preservation professional who meets the federal qualifications for historic architect and attests to conformance to the Secretary of the Interior’s Standards for the Treatment of Historic Properties.
To reduce heat islands to minimize effects on the microclimate and human and wildlife habitat.

Nonroof Measures
Use any combination of the following strategies for 50% of the nonroof site hardscape (including roads, sidewalks, courtyards, parking lots, parking structures, and driveways):

A. Provide shade from open structures, such as those supporting solar photovoltaic panels, canopied walkways, and vine pergolas, all with a solar reflectance index (SRI) of at least 29.

B. Use paving materials with an SRI of at least 29.

C. Install an open-grid pavement system that is at least 50% pervious.

D. Provide shade from tree canopy (within ten years of landscape installation).

High-Reflectance and Vegetated Roofs
Use roofing materials that have an SRI equal to or greater than the values in Table 1 for a minimum of 75% of the roof area of all new buildings within the project; or install a vegetated (“green”) roof for at least 50% of the roof area of all new buildings within the project. Combinations of SRI-compliant and vegetated roofs can be used provided they collectively cover 75% of the roof area of all new buildings. (Use the equation in Option 3).

Minimum Solar Reflectance Index Value, by Roof Slope

<table>
<thead>
<tr>
<th>Roof slope SRI</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (≤ 2:12)</td>
<td>78</td>
</tr>
<tr>
<td>Steep (&gt; 2:12)</td>
<td>29</td>
</tr>
</tbody>
</table>

To encourage energy efficiency by creating optimum conditions for the use of passive and active solar strategies.

Block Orientation (For Projects Earning at Least 2 Points Under NPD Credit 2, Compact Development)

Locate the project on existing blocks or design and orient the project such that 75% or more of the blocks have one axis within plus or minus 15 degrees of geographical east-west, and the east-west lengths of those blocks are at least as long as the north-south lengths of the blocks. Earn at least 2 points under NPD Credit 2, Compact Development.

Figure 1. Solar-oriented blocks with east-west lengths equal to or greater than north-south lengths, and east-west axis within 15 degrees of geographic east-west

Building Orientation (Available For All Projects)

Design and orient 75% or more of the project’s total building square footage (excluding existing buildings) such that one axis of each qualifying building is at least 1.5 times longer than the other, and the longer axis is within 15 degrees of geographical east-west. The length-to-width ratio applies only to walls enclosing conditioned spaces; walls enclosing unconditioned spaces, such as garages, arcades, or porches, cannot contribute to credit.
To encourage the development of energy-efficient neighborhoods by employing district heating and cooling strategies that reduce energy use and adverse energy-related environmental effects.

Incorporate a district heating and/or cooling system for space conditioning and/or water heating of new buildings (at least two buildings total) such that at least 80% of the project’s annual heating and/or cooling consumption is provided by the district plant. Single-family residential buildings and existing buildings of any type may be excluded from the calculation. Each system component that is addressed by ANSI/ASHRAE/IESNA Standard 90.1–2007 must have an overall efficiency performance at least 10% better than that specified by the standard’s prescriptive requirements.

Additionally, annual district pumping energy consumption that exceeds 2.5% of the annual thermal energy output of the heating and cooling plant (with 1 kWh of electricity equal to 3,413 Btu) must be offset by increases in the component’s efficiency beyond the specified 10% improvement. Combined heat and power (CHP) district systems can achieve this credit by demonstrating equivalent performance.
To reduce pollution from wastewater and encourage water reuse.

Design and construct the project to retain on-site at least 25% of the average annual wastewater generated by the project (exclusive of existing buildings), and reuse that wastewater to replace potable water. An additional point may be awarded for retaining and reusing 50%. Provide on-site treatment to a quality required by local regulations for the proposed reuse.
Progress set to use recycled and reclaimed materials to reduce the adverse environmental effects of extracting and processing virgin materials.

Use materials for new infrastructure such that the sum of postconsumer recycled content, in-place reclaimed materials, and one-half of the preconsumer recycled content constitutes at least 50% of the total mass of infrastructure materials.

Count materials in all of the following infrastructure items as applicable to the project:
A. Roadways, parking lots, sidewalks, unit paving, and curbs.
B. Water retention tanks and vaults.
C. Base and subbase materials for the above.
D. Stormwater, sanitary sewer, steam energy distribution, and water piping.

Recycled content is defined in accordance with ISO/IEC 14021, Environmental labels and declaration, self-declared environmental claims (Type II environmental labeling).
To reduce the volume of waste deposited in landfills. To promote the proper disposal of hazardous wastes.

Meet at least four of the following five requirements and publicize their availability and benefits:

a. Include as part of the project at least one recycling or reuse station, available to all project occupants, dedicated to the separation, collection, and storage of materials for recycling; or locate the project in a local government jurisdiction that provides recycling services. The recyclable materials must include, at a minimum, materials paper, corrugated cardboard, glass, plastics and metals.

b. Include as part of the project at least one drop-off point, available to all project occupants, for potentially hazardous office or household wastes; or locate the project in a local government jurisdiction that provides collection services. Examples of potentially hazardous wastes include paints, solvents, oil, and batteries. If a plan for postcollection disposal or use does not exist, establish one.

c. Include as part of the project at least one compost station or location, available to all project occupants, dedicated to the collection and composting of food and yard wastes; or locate the project in a local government jurisdiction that provides composting services. If a plan for postcollection use does not exist, establish one.

d. On every mixed-use or nonresidential block or at least every 800 feet, whichever is shorter, include recycling containers adjacent to other receptacles or recycling containers integrated into the design of the receptacle.

e. Recycle and/or salvage at least 50% of nonhazardous construction and demolition debris. Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and specifies whether the materials will be stored on-site or commingled. Excavated soil and land-clearing debris do not contribute to this credit. Calculations can be done by weight or volume but must be consistent throughout.
To minimize light trespass from project sites, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce adverse effects on wildlife environments.

“Shared areas” of a project are spaces and facilities dedicated to common use (publicly or privately owned). In residential areas, at least 50% of the external luminaires must have fixture-integrated lighting controls that use motion sensors to reduce light levels by at least 50% when no activity has been detected for 15 minutes.

In all shared areas, install automatic controls that turn off exterior lighting when sufficient daylight is available and when the lighting is not required during nighttime hours; these lights must meet the total exterior lighting power allowance.

Document which lighting zone or zones describe the project, and for all shared areas. If two or more different zones border the project, use the most stringent uplight requirements, and use light trespass requirements for the adjacent zone. Roadway lighting that is part of the project must meet the requirements for the appropriate zone. For illuminance generated from a single luminaire placed at the intersection of a private vehicular driveway and public roadway accessing the site, project teams may use the centerline of the public roadway as the site boundary for a length of two times the driveway width centered at the centerline of the driveway when complying with the trespass requirements.

Compliance with the light trespass requirements may alternatively be met by using only glare and back light compliant luminaires.

Stipulate covenants, conditions, and restrictions (CC&R) or other binding documents to require continued adherence to the requirement
To encourage strategies that address geographically specific environmental, social equity, and public health priorities.

Earn up to four of the six Regional Priority credits. These credits have been identified by subject matter experts representing the U.S. Green Building Council (regional councils and chapters), the Congress for the New Urbanism (chapters and membership in regions without chapters), and Smart Growth America (members of Smart Growth America’s State and Local Caucus or their designees) as having additional regional importance for the project’s location. A database of Regional Priority credits and their geographic applicability will be available on the USGBC website, www.usgbc.org. One point is awarded for each Regional Priority credit earned, up to a maximum of 4. Non-U.S. projects are not eligible for Regional Priority credits.