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Filed:	01/20/2011
180th day:	07/19/2011
Staff report prepared:	02/16/2011
Staff report prepared by:	Susan Craig
Staff report approved by:	Dan Carl
Hearing date:	03/11/2011

COASTAL DEVELOPMENT PERMIT APPLICATION

Application number ..... **3-10-061, UCSC/City of Santa Cruz Renewable Energy Experiment**

Applicant..... University of California at Santa Cruz (UCSC) and the City of Santa Cruz

Project location ..... On top of the Wharf Headquarters building at the City of Santa Cruz Municipal Wharf, City of Santa Cruz (Santa Cruz County).

Project description..... Temporarily install a solar panel, a wind turbine, and associated skid-mounted sensors onto the roof of the wharf headquarters building for one year as part of a research project designed to evaluate the efficacy of these alternative energy sources.

File documents..... City of Santa Cruz Local Coastal Program (LCP).

Staff recommendation ..... **Approval with Conditions**

A.Staff Recommendation

1. Summary of Staff Recommendation

The University of California at Santa Cruz (UCSC) in collaboration with the City of Santa Cruz proposes to perform a study in which UCSC student and faculty investigators and City of Santa Cruz staff will evaluate solar and wind renewable energy technologies at the Santa Cruz Municipal Wharf (Wharf). The proposed project includes the temporary installation of a solar panel, a small-scale vertical axis wind turbine (11 feet in height), and associated skid-mounted sensors on a platform on the roof of the Wharf Headquarters (Wharf HQ) building. The equipment would be removed at the end of the study (at most one year later).

The Santa Cruz Wharf is a signature element of the Santa Cruz coastline, and development there must be understood in relation to such siting and the way it affects public viewsheds upcoast and downcoast, as well as on the Wharf itself. The proposed research equipment will be mounted on the rooftop of an existing building that is located among other wharf buildings, and as a result the research equipment's visual impact will be tempered. The proposed wind turbine raises the only question in this regard, as it will extend 11 feet above the roof and will occupy a 6-foot diameter area. It will be visible from a number of popular public viewpoints located near the Wharf, including Lighthouse Point, West Cliff Drive, Cowell Beach, and Main Beach, as well as from the Wharf itself. However, from these locations

the wind turbine will be seen in the context of existing Wharf development, which includes numerous buildings (including two-story buildings), light poles, and other existing rooftop development. Thus, the wind turbine will be seen from these public viewpoints in conjunction with and as part of existing Wharf development and the minor visual intrusion should not significantly degrade these public views. Similarly, the turbine should only minimally affect views on the Wharf itself, specifically of the skyline above the Wharf HQ building. In addition, the proposed wind turbine and other equipment will only be installed at this location for a year and will be removed at the conclusion of the research project, meaning any such visual incursion will be temporary and the viewshed will be returned to its current state over the longer term. The other equipment proposed to be mounted on the roof is smaller in scale and in height than the proposed wind turbine and will have minimal impact on views from nearby popular public viewpoints. Thus, the proposed project can be found consistent with the Coastal Act's public viewshed protection provisions.

The Wharf extends out into the Monterey Bay and this over-water location contributes to the Wharf being a magnet for marine wildlife (e.g., resident sea lions), including a variety of shorebirds. The proposed rooftop research elements will be mostly low profile and do not raise any potential marine wildlife resource concerns, with the exception of the vertical axis wind turbine component. The concern with the wind turbine is that shorebirds may fly into its rotating blades and be injured or killed. This bird strike concern has been raised in past similar cases before the Commission of proposed wind turbines such as this in shoreline locations; most recently last year in downcoast Santa Cruz County near Pleasure Point where the Commission denied a similar turbine to be attached to a single-family residence over concerns related to this issue and others (including issues with respect to public viewshed degradation, whether such a structure was even allowed per the LCP, potential cumulative impacts, and the need for LCP planning to account for such development).

There is a significant body of literature on bird strikes related to large wind farms and large horizontal axis (i.e., propeller) turbines, and the impacts of such structures on birds. Based on this body of knowledge, wind turbines in general have developed the reputation of being dangerous to avian wildlife. However, there is a dearth of literature regarding the effects of small-scale vertical axis wind turbines on birds, and the lack of such studies has made it difficult for the Commission and other decision-makers to clearly understand potential bird strike issues in relation to objective data and analysis. While it is assumed by some that small-scale vertical axis wind turbines, such as the one proposed, do not lead to the type of significant bird strike problems associated with larger scale horizontal wind turbines, and while this assumption makes sense given the relative difference in scale between the two types, this assumption is difficult to verify at this time absent relevant data regarding bird strikes and small-scale vertical axis wind turbines. Thus, although staff believes that the wind turbine in this case is unlikely to lead to significant bird injury and mortality, staff cannot conclusively state this to be the case.

In this case, the wind turbine component of the proposed research project provides an excellent opportunity to collect data to better inform the Commission and others in the future regarding the potential of bird strike injuries and fatalities due to the installation of small-scale vertical axis wind turbines on or near the coast. As long as the permit is structured to clearly require the collection and synthesis of relevant data, and so long as it is also structured for the wind turbine to be removed should

it lead to significant bird strike impacts, the proposed project can avoid significant resource impacts consistent with the Coastal Act at the same time as it provides useful data for the Commission and others on the bird strike issue. Staff, including the Commission's senior ecologist Dr. John Dixon, have reviewed the proposed project and have coordinated with resource counterparts at the California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS), and Dr. Dixon as well as CDFG and USFWS biologists are supportive of the proposed project and the concomitant opportunity to obtain data regarding small-scale vertical axis wind turbines and potential bird strikes. As such, staff recommends that the Commission approve a CDP for the project subject to requiring a bird strike research plan that will require: 1) daily inspection of the rooftop and surrounding area for the duration of the wind turbine component of the research project to identify any dead or injured bird(s); 2) regular reporting of bird strike data to the Executive Director, CDFG, and USFWS during this time, and; 3) submission of a final report on bird strikes to the Executive Director, CDFG, USFWS, and the California Audubon Society upon completion of the wind turbine component of the research project. If at any time during the research project the Executive Director determines that the wind turbine is having a significant adverse impact on birds, including based on input to that effect from CDFG and/or USFWS, the wind turbine component of the research project will be halted immediately and the wind turbine removed from the roof.

In short, the proposed project will provide important data for understanding the costs and benefits of solar and wind renewable energy technologies, and can be conditioned to ensure resource protection. Staff recommends that the Commission approve a conditional CDP for the proposed energy research project, including the wind turbine component. The motion to adopt the staff recommendation is found directly below.

2. Staff Recommendation on CDP Application

Staff recommends that the Commission, after public hearing, **approve** the CDP for the proposed development subject to the standard and special conditions below.

Motion. I move that the Commission approve coastal development permit number 3-10-061 pursuant to the staff recommendation, and I recommend a yes vote.

Staff Recommendation of Approval. Staff recommends a **YES** vote. Passage of this motion will result in approval of the coastal development permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

Resolution to Approve a Coastal Development Permit. The Commission hereby approves the coastal development permit on the grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the coastal development permit complies with the California Environmental Quality Act because either: (1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the amended development on the environment; or (2) there are

no feasible mitigation measures or alternatives that would substantially lessen any significant adverse effects of the amended development on the environment.

Report Contents

B.Findings and Declarations

The Commission finds and declares as follows:

1. Project Location

The Santa Cruz Municipal Wharf (Wharf) is located on the north end of Monterey Bay in the City of Santa Cruz. The Wharf, a City-owned facility, was built in 1914 and was originally used primarily for the docking of cargo vessels. The Wharf's function as a shipping utility ceased in the late 1930s. Currently the Wharf's main function is that of a well-used tourist center, attracting an estimated two to three million visitors annually to the numerous restaurants, fish markets, and shops that are located in one and two story structures on the upcoast side of the Wharf. The Wharf also includes businesses that provide recreational-fishing charter boats, kayak rentals, whale watching tours, and similar visitor-serving opportunities. Other areas of the Wharf, such as the downcoast side of the Wharf, the end of the

Wharf, and the bandstand promenade remain open to provide for general public recreational use as well as to help preserve and enhance public views from the Wharf to the surrounding ocean and onshore areas (including Lighthouse Point, the Santa Cruz Beach Boardwalk, West Cliff Drive, and the world famous surfing area known as Steamer Lane). These open areas of the Wharf also ensure that the Wharf's scale maintains an appropriate balance between structures and open space so as to maintain the overall public Wharf character, as well as ensuring that Wharf development does not adversely impact the significant public shoreline vantages as seen from the Wharf.

At approximately one-half mile in length, the Wharf is one of the longest wharves on the West Coast, and it is designated as an historical landmark in the City of Santa Cruz LCP. Please see Exhibit A for a location map and Exhibits B and D for photographs of the Wharf.

2. Project Description

The Applicants propose a research study in which UCSC student and faculty investigators and staff from the City of Santa Cruz will evaluate solar and wind renewable energy technologies at the Wharf. The proposed project includes the installation of a solar panel, a small-scale vertical axis wind turbine (11 feet in height), and associated skid-mounted sensors on a platform on the roof of the Wharf Headquarters (Wharf HQ) building. The solar panel, the wind turbine, and associated sensors would be temporarily installed for the duration of the study (proposed to last up to one year) and these instruments would be removed when it is completed. Researchers will be gathering data from these instruments to evaluate the efficacy of renewable energy development on the Wharf. The Applicants indicate that the proposed project is a stand-alone research project and that it is not tied to evaluating the potential for some type of future larger scale and/or permanent renewable energy project at the Wharf.[1] The following list includes the specific equipment proposed to be installed on a roof-mounted platform on top of the Wharf HQ building:

- 12-foot x 8-foot equipment platform
- 1 KW vertical axis wind turbine
- MFR-7 16" x 7" rotating shadowband radiometer
- Schuco SMAU-1 39" x 59" solar panel
- Apogee SP-215 pyranometer mounted on 8-foot pipe
- Solar electronics (custom circuitry to measure output power of solar panel) and battery box
- Camera C328R mounted to a 2" x 2" circuit board to monitor wind turbine and solar panel face

The equipment platform will extend about 8 inches above the roof height (which is 17 feet above the Wharf deck), and all other equipment will be lower than 3 feet above the platform with the exception of the pyranometer (extending 8 feet above the roof on top of a pipe) and the wind turbine (extending 11

[1] Any such future project would be independent of this one. In short, this project is not intended as a pilot or precursor designed to facilitate such a larger project, and the Commission is not evaluating the appropriateness of any such future project conceptually or otherwise. Rather, based on the Applicants' representations, the Commission is evaluating this as a one-year general research project designed to provide the City and UCSC researchers with data for understanding wind and solar power generation costs and benefits more generically.

feet above the roof). In addition, the proposed project includes installation of an interpretive panel at the Wharf HQ building to inform visitors to the Wharf about the purpose and schedule of the proposed project, as well as the equipment being used and the data being collected. This interpretive panel will be mounted on the street-side face of the Wharf HQ building at eye level and will remain in place for the duration of the research project.

Please see Exhibit C for photographs and schematics of the proposed project and its equipment.

3. Coastal Development Permit Determination

The Santa Cruz Municipal Wharf is located over the Monterey Bay and within the Commission's retained coastal development permit jurisdiction. The City has a certified Local Coastal Program (LCP), which includes Wharf Design Criteria (see Exhibit E) that contains guidelines for development on the Wharf. The certified LCP and the Wharf Design Criteria can serve as non-binding guidance to the Commission, but the standard of review for the proposed project is the Coastal Act.

A. Scenic Resources

Coastal Act Sections 30251 and 30253(5) protect scenic resources and the community character of popular visitor destination points. In particular:

> ***Section 30251:*** *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas…*
>
> ***Section 30253(5):*** *New development shall, where appropriate, protect special communities and neighborhoods which, because of their unique characteristics, are popular visitor destination points for recreational uses.*

Additionally, City of Santa Cruz LCP Community Design Element Policy 3.5 states:

> ***LCP Community Design Element Policy 3.5:*** *New or renovated development shall add to, not detract from City-identified landmarks, historic areas, and buildings, and established architectural character worthy of preservation.*

Coastal Act Section 30251 calls for protection of the scenic and visual qualities of coastal areas. Coastal Act Section 30253(5) states that new development shall protect areas that are popular visitor destination points for recreational uses, such as the Wharf and the surrounding area. The City's LCP requires that new development not detract from City-identified historical landmarks, which includes the Wharf, and the LCP's Wharf Design Criteria (Exhibit E) require the preservation and improvement of views to and from the Wharf.

The historic Santa Cruz Municipal Wharf attracts approximately two to three million visitors per year,

making the Wharf one of Santa Cruz's most important visitor serving recreational attractions. The Wharf has tremendous appeal, drawing visitors from many geographical locations. Visitors come for the seaside attributes of the Wharf – water, fishing, boating, fresh air, and beautiful scenery – as well as for restaurants, gift shops, and fish markets. Views from the Wharf include those of the Wharf and its own environs, as well as those toward Lighthouse Point, the Santa Cruz Beach Boardwalk, West Cliff Drive, and the world famous surfing area known as Steamer Lane. Similarly, the Wharf is prominent in views from these and other significant coastal vantages along the shoreline. In short, the Santa Cruz Wharf is a signature element of the Santa Cruz coastline, and development there must be understood in relation to such siting and the way it affects public viewsheds up and downcoast, as well on the Wharf itself. The proposed research equipment will be located on the rooftop of an existing building located amongst other Wharf buildings, and as a result its impact will be tempered. The proposed wind turbine raises the only question in this regard as it will extend well above the roof, it is fairly wide, and it will be visible from a number of popular public viewpoints located near the Wharf, including Lighthouse Point, West Cliff Drive, Cowell Beach, and Main Beach, as well as from the Wharf itself. The wind turbine will be mounted on a "tower" or pole that is 3 feet 3 inches in height, and the turbine itself will extend about 7 feet above the tower. Thus, the total height of the platform, the tower, and the wind turbine is about 11 feet. Given that the rooftop of the Wharf HQ building is 17 feet, the elevation of the wind turbine will be 28 feet (11 feet + 17 feet) above the base elevation of the Wharf deck. The diameter of the proposed wind turbine is 6 feet (see pages 1 and 3 of Exhibit C for a photograph and dimensions of the proposed wind turbine). The other equipment proposed to be installed will only extend up to about 3 feet above the roof, and will not significantly impact any views. The pyranometer (a small solar strength measurement device) will extend on a pole to about 8 feet above the roof, but because it is so narrow, its view impact will be relatively minor from significant viewing areas.

The Applicant has provided photographic simulations of the visibility of the proposed wind turbine from popular public viewpoints near the Wharf, including Lighthouse Point, Cowell Beach, and Main Beach (see Exhibit D). While the proposed wind turbine will be visible from these locations, it will be seen in the context of existing Wharf development which includes numerous buildings (including two-story buildings), light poles, and other existing rooftop development (including antennas, flags and flagpoles, a lifeguard station located on top of a single story building, etc.). Thus, from the above-mentioned vantage points, the wind turbine will be seen in conjunction with and as part of the existing Wharf development, and the minor visual intrusion associated with it should not significantly degrade these public views. Similarly, the turbine should only minimally affect views on the Wharf itself, specifically of the skyline above the headquarters building. The other equipment proposed to be mounted on the roof is smaller in scale and in height than the proposed wind turbine and will have minimal impact on views from these nearby popular public viewpoints. In addition, the proposed wind turbine and other equipment will only be installed at this location for up to a year, and will be removed at the conclusion of the research project, meaning any such incursion will be temporary, and the viewshed will be returned to its current state over the longer term. In sum, the proposed wind turbine and other research equipment will be located on the rooftop of an existing building in an area with significant coastal visual resources. However, given the relatively modest size and scale of the proposed wind turbine and associated equipment in relation to surrounding existing development on the Wharf, as well as the

temporary nature of the proposed research project, the proposed project will not significantly impact the viewshed in this area or the historic character of the Wharf. Therefore, the Commission finds that the project is consistent with Coastal Act Sections 30251 and 30253(5).

B. Wildlife Resources

1. Applicable Policies

Coastal Act Sections 30230 and 30231 afford protection of marine resources and their associated biological productivity and state:

> ***Section 30230:*** *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*
>
> ***Section 30231:*** *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Complementary policies are provided with respect to coastal resources in general in Section 30250(a), which states, in applicable part:

> ***Section 30250(a):*** *New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located…where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.*

Additionally, City of Santa Cruz LCP Environmental Quality Element Policies 4.1 and 4.2.5 state:

> ***LCP Environmental Quality Element Policy 4.1:*** *Protect the natural ecosystem of the Monterey Bay Marine Sanctuary and the shoreline.*
>
> ***LCP Environmental Quality Element Policy 4.2.5:*** *Protect and minimize the impact of development on bird, fish, and wildlife habitat in and adjacent to waterways.*

Also, the certified Wharf Design Criteria contain policies and criteria designed to protect the marine environment (see Exhibit E).

The Wharf extends out into the Monterey Bay and this over-water location contributes to the Wharf

being a magnet for marine wildlife (e.g., resident sea lions). A variety of shorebirds are found at the Wharf, mostly consisting of a number of gull species and California brown pelicans.[2] Cormorants and other shorebirds use the nearby ocean waters but generally are not found on the Wharf itself. Other non-shore birds found at the Wharf include Brewer's blackbird and the nonnative European starling.

The Coastal Act requires protection of marine resources and coastal resources in general, extending to coastal wildlife, wildlife corridors, and migratory birds, even for areas that may not meet the definition of sensitive habitat. The proposed rooftop research elements will be mostly low profile and do not raise any potential resource concerns in this respect, with the exception of the vertical axis wind turbine component. The concern with the wind turbine is that shorebirds may fly into its rotating blades and be injured or killed. This concern is magnified because the turbine would be atop a building out on a wharf that itself is over the ocean where winds are generally stronger than on land (where there are intervening buildings etc.), and wind currents pushing across the Wharf necessarily push up and over rooftop areas, potentially pushing birds into this area as well. This issue is common to turbine cases, as the best place for capturing wind is by definition generally the same place where wind is strongest. This bird strike concern has been raised in past similar cases before the Commission, most recently last year in downcoast Santa Cruz County near Pleasure Point. In that case, the Commission denied a similar turbine that was proposed for a single-family residence over concerns related to the potential bird strike issue and other issues (including issues regarding public viewshed degradation, whether such a structure was even allowed per the LCP, potential cumulative impacts, and the need for LCP planning to account for such development).[3]

The Commission is supportive of efforts to tap more environmentally friendly power sources (such as wind and solar in this case), but also believes that such efforts are not necessarily environmentally benign in all cases, and that such projects can raise significant questions regarding protecting wildlife.

Although there is a dearth of literature on the effects of small-scale vertical axis wind turbines on birds, such as the one proposed, there is a significant body of literature on bird strikes related to large wind farms and large horizontal axis (i.e., propeller) turbines, and the impacts of such structures on birds. Based on this body of knowledge, wind turbines in general have developed the reputation of being dangerous to avian wildlife. Much of this reputation comes from documentation associated with the Altamont Pass wind farm (well inland of both the coastal zone and the Bay Area in Northern California) where more than 6,500 wind turbines, mainly large horizontal axis machines, have caused significant bird kills over the years. Design elements that typically contribute to verified bird kills include tall (100-300 feet) turbines sited within migratory routes, including where topography and air currents 'funnel' birds into turbines; turbines with long blades and/or high speeds that have a high "smear" factor, which are difficult for birds to perceive; certain types of mounted lighting which attract migrating birds; tower designs with lattice and bracing that raptors can perch in, and are then struck by the large, slow-moving blades upon takeoff; guy wires used to stabilize turbine towers, which are difficult for birds to see;

[2] The brown pelican was removed from the California endangered species list in February 2009 and from the federal endangered species list on November 17, 2009.

[3] A-3-SCO-05-073-A1 (Porter), January 2010.

utility lines overhead instead of trenched; and close spacing of turbines, creating a barrier for migration and feeding activity.[4] Although birds are well known to have exceptionally keen vision and generally avoid flying into fast-moving, highly visible objects, such as wind-whipped tree branches, they have been known to collide with various objects, such as highly reflective surfaces, structures that are within migratory heights and obscured by low clouds or fog or when they contain bright lights that confuse birds, and structures that are located in valleys or on ridgelines where air currents may direct birds into the structures, particularly at night.[5]

Although it is possible that birds may die in higher numbers overall due to collisions with other structures,[6] it is clear from the literature that large horizontal axis wind turbines as a category result in a significant amount of bird and bat mortality. And although there have been some who have hypothesized that smaller wind turbines, including those not within the normal height range of migrating birds, might be safer for birds,[7] there is currently a lack of research-backed data that can clearly demonstrate the relative bird safety of smaller units, such as that proposed in this case. The lack of such studies has made it difficult for the Commission and other decision-makers to clearly understand potential bird strike issues in relation to objective data and analysis. While it is assumed by some that small-scale vertical axis wind turbines, such as the one proposed, do not lead to the type of significant bird strike problems associated with larger scale horizontal wind turbines, and while this assumption makes sense given the relative difference in scale generally between the two types, this assumption is difficult to verify at this time absent relevant data regarding bird strikes and small-scale vertical axis wind turbines. Thus, although the Commission does not believe that the wind turbine in this case is likely to lead to significant bird injury and mortality, the Commission also cannot conclusively state this to be the case. As a result of this lack of data, some have recommended allowing some small-scale wind

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4 See, for example, City of Berkeley, Office of Energy and Sustainable Development. "Wind Turbine Background, Project Scope, and Environmental Review for the Shorebird Nature Center Southwest Wind Power Small Wind Turbine Beta Test Project." March 7, 2006. Available at: http://www.ci.berkeley.ca.us/citycouncil/2006citycouncil/packet/032106/2006-03-21%20Item%2013%20Wind%20Turbine%20at%20Shorebird%20Nature%20Center.pdf.

5 Id (City of Berkeley 2006).

6 For example, a 2001 study by the National Wind Coordinating Committee compared various forms of avian mortality in the United States and found that avian collision mortality associated with wind turbines is lower than collision deaths related to other human structures, like buildings and windows, communication towers, vehicles, and power lines (see: The National Wind Coordinating Committee. Avian Collisions with Wind Turbines: A Study of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States. August 2001. Available at: http://www.west-inc.com/reports/avian_collisions.pdf). This report concluded that even if wind turbines were quite numerous (e.g., 1 million turbines), they would likely cause no more than a few percent of all bird collision deaths related to human structures.

7 For example, a 2001 California Audubon Society letter supporting small-scale wind turbines concluded these units would not lead to a significant threat to bird populations, including because they are much smaller than the Altamont Pass variety, and not generally within the normal height range of migrating birds (see: John McCaull, Legislative Director, National Audubon Society – California. Letter to Assemblyman John Longville in Support of AB 1207. July 17, 2001). More recently, both the Massachusetts chapter of the Audubon Society in Newburyport and the Audubon National Wildlife Refuge in Coleharbor, North Dakota have added or will be adding single-use vertical axis wind turbines to their facilities (see: Katie Farrell, "Mass Audubon seeks OK for wind turbine," Newburyport News, July 31, 2009 and James E. Ducey, "New Facility at Audubon Refuge to be Energy Efficient and Bird-Safe," July 6, 2009, www.bloggernews.net/121474 and http://wildbirdsbroadcasting.blogspot.com.).

turbines to be installed and monitored to help provide relevant data.[8]

In this case, the wind turbine component of the proposed research project provides an excellent opportunity to collect data to better inform the Commission and others in the future regarding the potential for bird strike injuries and fatalities due to the installation of small-scale vertical axis wind turbines. As long as the proposed research project is structured to clearly collect and synthesize relevant data, and as long as it is also structured for the wind turbine to be removed should it lead to significant bird strike impacts, the proposed project can avoid significant resource impacts consistent with the Coastal Act at the same time as providing useful data for the Commission on the bird strike issue. The Commission's senior ecologist, Dr. John Dixon, has reviewed the proposed project and has coordinated with counterparts at the California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS). Dr. Dixon as well as CDFG and USFWS biologists are supportive of the proposed project and the concomitant opportunity to obtain data regarding small-scale vertical axis wind turbines and potential bird strikes.[9] As such, with appropriate conditions, described below, the Commission can find the proposed project consistent with the Coastal Act.

Specifically, this project is conditioned to require a bird strike research plan (Plan). This Plan will require daily inspection of the Wharf HQ rooftop and surrounding area for the duration of the wind turbine component of the research project to identify any dead or injured bird(s) and to report this data to the Executive Director, CDFG, and USFWS on a regular basis. If at any time the Executive Director determines that the wind turbine is having a significant adverse impact on birds, including based on input to that effect from CDFG and/or USFWS, the wind turbine component of the research project will be halted immediately and the wind turbine removed from the roof. This condition also requires that a final report on bird strikes be submitted to the Executive Director, CDFG, USFWS, and the California Audubon Society to ensure that the data collected are disseminated widely and become available to interested agencies and the general public at large.

In short, the proposed project will provide important data for understanding the costs and benefits of renewable energy technologies, including solar and wind power generation, and can be conditioned to ensure resource protection. As conditioned, the proposed project can be found consistent with Coastal Act Sections 30230, 30231, and 30250 as discussed in these findings.

4. Coastal Development Permit Conditions of Approval

A. Standard Conditions

[8] For example, the City of San Francisco's Bird Safe Buildings effort in 2010 discussed small-scale wind turbines and noted that "While it is unreasonable to believe that these small urban systems would cause the annihilation of birds such as the well-known disaster at Altamont, California…a certain amount of caution is prudent in the absence of established scientific research. The Planning Department has exercised that caution primarily by allowing a more widespread installation of vertical axis machines, and limiting locations of horizontal axis, open-bladed generators to areas that would seem to be less densely populated by birds, especially migrants and juveniles…The only clear way at present to learn whether small urban wind generators will harm birds is to allow the installation of a few, and to monitor the interactions with animals, if any."

[9] Personal communications from Suzanne DeLeon (CDFG) and Chris Diel (USFWS).

1. **Notice of Receipt and Acknowledgment.** The permit is not valid and development shall not commence until a copy of the permit, signed by the Permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.
2. **Expiration.** [Omitted – see Special Condition 1 below].
3. **Interpretation.** Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.
4. **Assignment.** The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.
5. **Terms and Conditions Run with the Land.** These terms and conditions shall be perpetual, and it is the intention of the Commission and the Permittee to bind all future owners and possessors of the subject property to the terms and conditions.

B. Special Conditions

1. **Approved Duration.** All elements of the approved project shall be removed in their entirety and the project area returned to its pre-development condition or better within one-year of installation or by September 1, 2012 whichever occurs first.
2. **Bird Strike Research Plan. PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT,** the Permittees shall submit to the Executive Director for review and approval two copies of a bird strike research plan. The bird strike research plan shall provide for, at the least, the following:

   (a) Daily inspection of the Wharf Headquarters rooftop and surrounding area for the duration of the wind turbine component of the research project. Any injured or dead birds identified shall be photo documented, collected, removed from the rooftop, and identified as to genus and species by a qualified avian expert. Any injured native birds found shall be taken to Native Wildlife Rescue in Santa Cruz County for potential rehabilitation. Each inspection shall also include inspection of the roof, surrounding area, and wind turbine itself for any evidence of bird strike (e.g., feathers, blood, etc.) even if no injured or dead birds are found, where such evidence shall be documented, including with photographs, and potential bird strike impacts quantified as much as possible based on the evidence collected.

   (b) For the duration of the wind turbine component of the research project, and at least once every month, the Permittees shall provide a copy of all documentation materials associated with the daily inspections to the Executive Director and appropriate staff at the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS), and shall inform the Executive Director and CDFG and USFWS staff immediately upon identifying any injured and/or dead birds. If the Executive Director determines that the wind turbine is having significant adverse impacts to birds in the area due to injuries and/or deaths caused by the wind turbine, the wind turbine component of the project shall be halted immediately and the wind

turbine shall be removed.

(c) Within 90 days of the removal of all project elements pursuant to Special Condition 1 or within 90 days of removal of the wind turbine pursuant to Special Condition 2(b), whichever occurs first, the Permittees shall submit a final report to the Executive Director, CDFG, USFWS, and the California Audubon Society that presents the results of the daily inspections, and correlates that data to the data collected on both wind patterns and wind energy generation as part of the research effort, including providing research conclusions on wind, wind energy generation, and bird strike in a way that identifies conclusions translatable generally as well as specific to the environs and the wind turbine type itself.

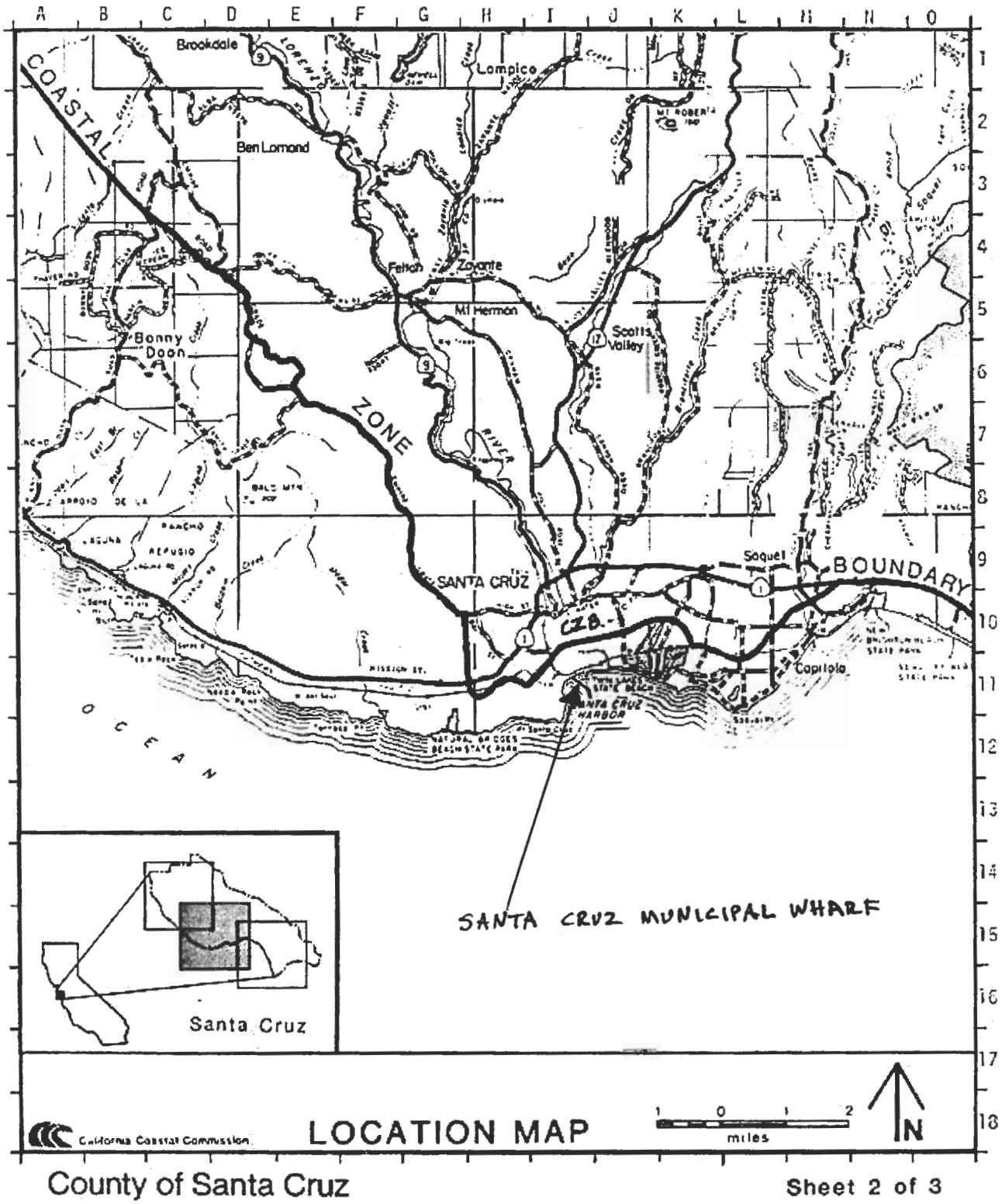
The Permittees shall undertake development in accordance with the approved bird strike survey research plan.

5. California Environmental Quality Act (CEQA)

Section 13096 of the California Code of Regulations requires that a specific finding be made in conjunction with coastal development permit applications showing the application to be consistent with any applicable requirements of CEQA. Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effect which the activity may have on the environment.

The City, acting as the CEQA lead agency, found that the proposed project was exempt from CEQA requirements. The Coastal Commission's review and analysis of land use proposals has been certified by the Secretary of Resources as being the functional equivalent of environmental review under CEQA. The Commission has reviewed the relevant coastal resource issues with the proposed project, and has identified appropriate and necessary modifications to address adverse impacts to such coastal resources. All public comments received to date have been addressed in the findings above. All above findings are incorporated herein in their entirety by reference.

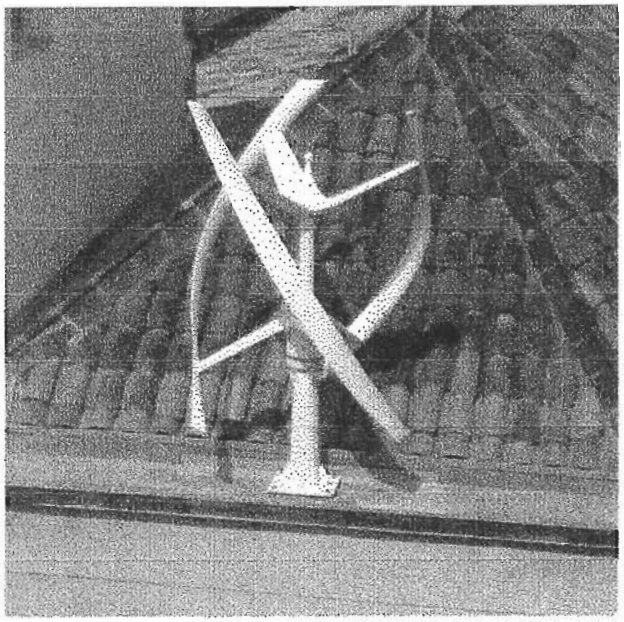
The Commission finds that only as modified and conditioned by this permit will the proposed project avoid significant adverse effects on the environment within the meaning of CEQA. As such, there are no additional feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse environmental effects that approval of the proposed project, as modified, would have on the environment within the meaning of CEQA. If so modified, the proposed project will not result in any significant environmental effects for which feasible mitigation measures have not been employed consistent with CEQA Section 21080.5(d)(2)(A).



CCC Exhibit A
(page 1 of 1 pages)


Santa Cruz Municipal Wharf
Municipal Wharf, Santa Cruz, CA
Eye alt 4296 ft
36°57'33.44" N 122°01'23.14" W elev 0 ft
Imagery Date: May 23, 2009
Exhibit B
3-10-061
Page 1 of 1

Urban Green Energy



UGE-1K

1kW 2nd Generation Vertical Axis Wind Turbine Specifications

Grid-tie and Off-grid Models

Annual Capacity: With an average annual wind velocity of 5.5 m/s, the 1KW unit will product 1200 to 2100 KWh/year.

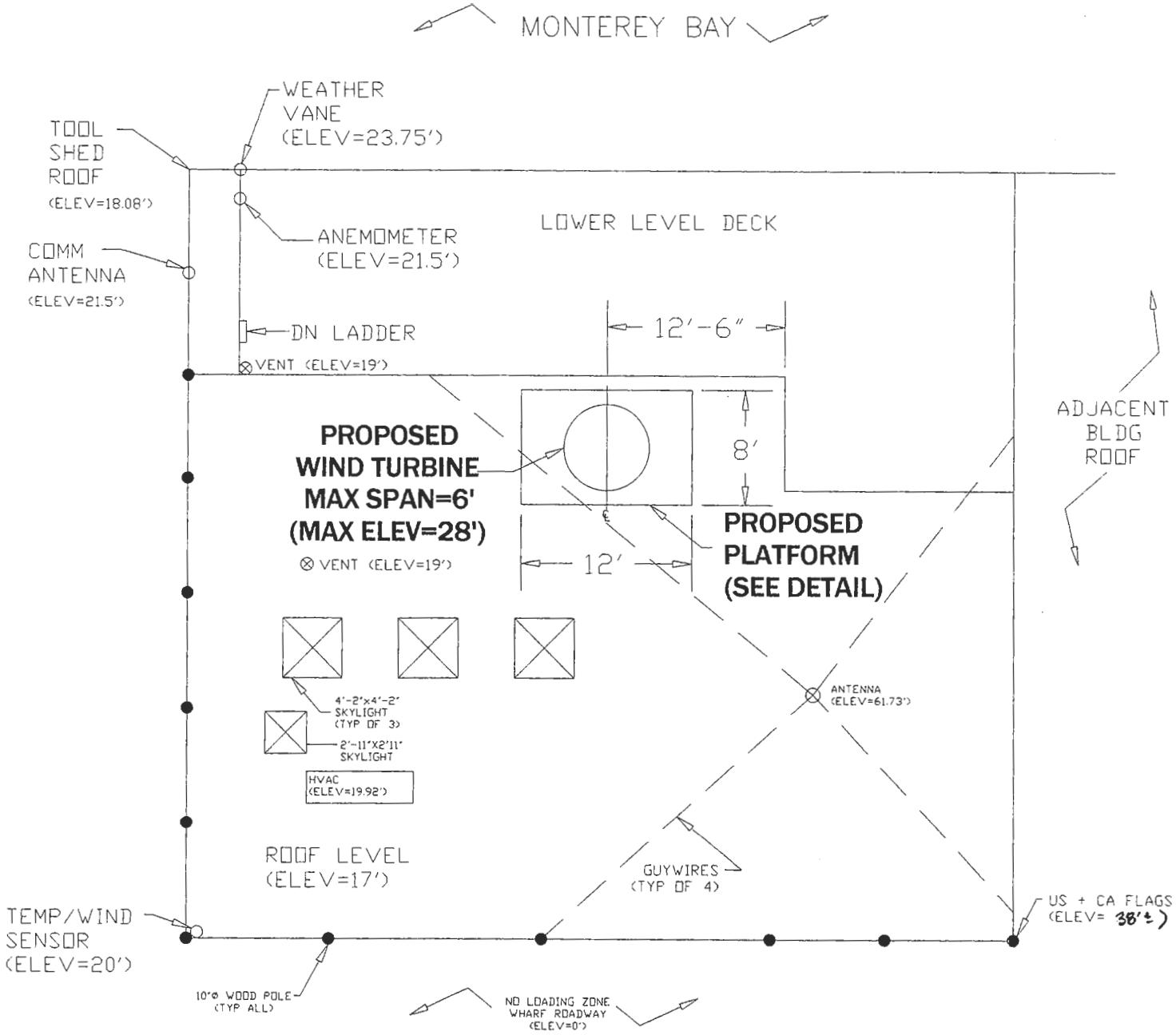
Physical Parameters	
Turbine Diameter (average)	1.6m
Turbine Height	2.3m
Turbine weight (with generator)	160kg
Gross Weight w/Tower	360kg
Gross Weight w/Roof Mount	260kg
Shipping size	3.7 M^3

Performance Parameters	
Start-up wind speed	2.5m/s (5.5 mph)
Cut-in wind speed	3.3m/s (8 mph)
Cut-out wind speed	25m/s (56 mph)
Rated wind speed	12m/s (27 mph)
Max (survival) wind speed	50m/s (112 mph)
Rated Lifetime	20 Years
Braking	Electronic braking

Noise Levels	
Within 3m @ <7 m/s	< 27 dB(A)
Within 3m @ 7 – 10 m/s	< 32 dB(A)
Within 3m @ 10 – 13 m/s	< 37 dB(A)

Certifications	
Wind Turbine System	CE Certified and IEC 61400-2
Grid-tie Inverter	Ordered to Match Local Utility Requirements

CCC Exhibit C
(page 1 of 8 pages)

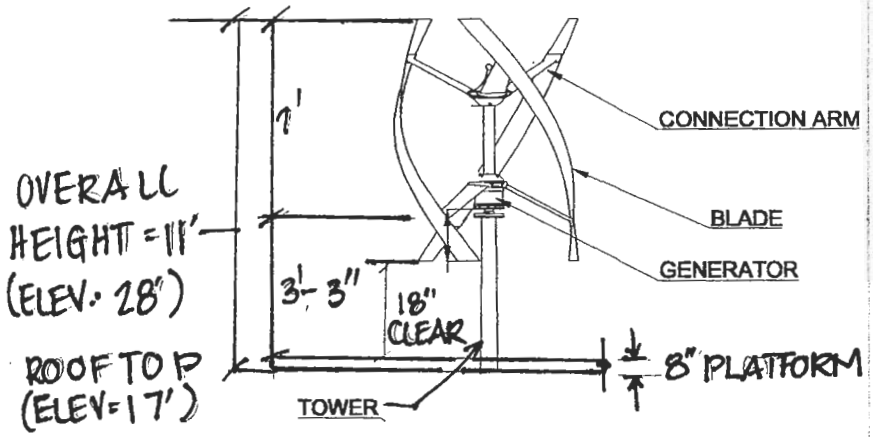


WHARF HQ ROOF PLAN

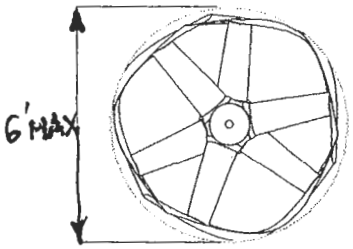
SCALE 3/32=1'0"

1 ALL FEATURES ARE EXISTING UNLESS NOTED AS PROPOSED
2 SEE PLATFORM DETAILS IN ENCLOSURE PACKAGE

CCC Exhibit C
(page 2 of 8 pages)



FRONT VIEW



TOP VIEW

UGE-1K-D

WIND TURBINE

UGE-1K DIMENSIONS PLAN

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Urban Green Energy

100 W. Red Oak Valley 123, New York, NY, 10023 USA

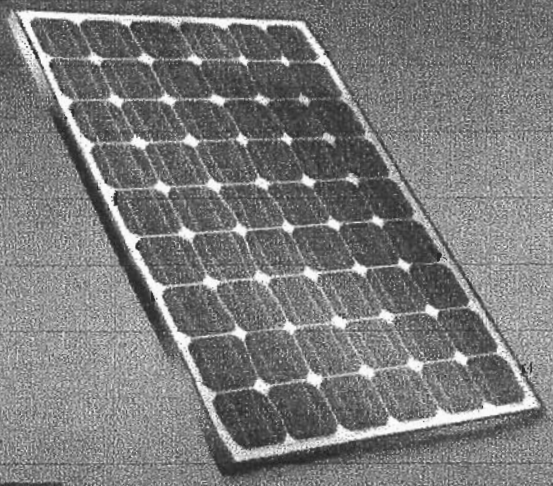
PHONE:(917.512.7500 FAX:(917.591.0917

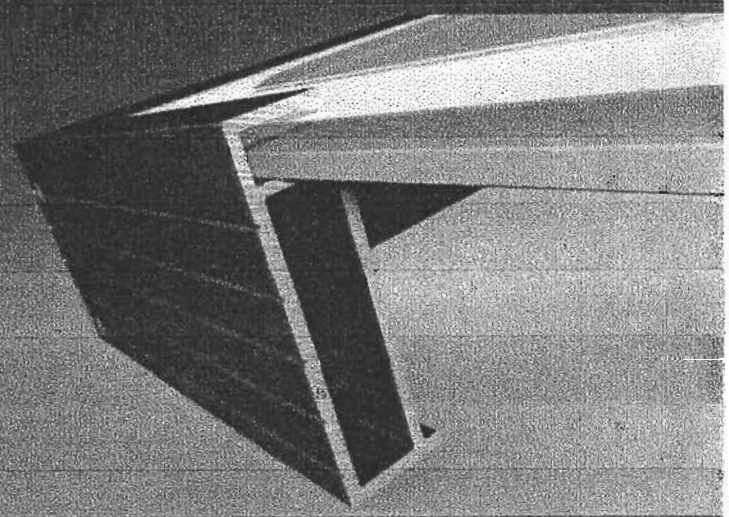
www.urbangreenenergy.com

CCC Exhibit C
(page 3 of 8 pages)

Schüco SMAU-1 Series

Monocrystalline Photovoltaic Module





Highest quality PV module
The SMAU-1 series of Schüco PV modules are distinguished by monocrystalline solar cells with a cell efficiency of up to 16.8 % for high outputs per square metre of module area. The output tolerance of an SMAU-1 module is +3 / -3 %, only modules of the highest quality provide this level of reliability.

Comprehensive warranty
Schüco SMAU-1 modules have a 5-year product warranty. In fact, the warranty on output values is considerably longer – after 25 years, the Schüco module will still *provide at least 80 %* of its rated output. Every SMAU-1 module is manufactured according to current quality standards.

Optimized labeling
Prior to delivery, each SMAU-1 module is subject to a visual and electrical quality test. The performance data measured is indicated on the back of the module and on the packaging. Homogeneous module fields can be grouped together quickly and effectively during installation.

High level of operational reliability
Schüco SMAU-1 modules have a connecting box on the back of the module that is fitted with three bypass diode bridges. This prevents individual solar cells from overheating (hot-spot effect) and ensures the reliable operation of the overall system from module field and inverter. The connecting box, solar cables and plug systems are of the highest quality and are also certified as individual components.

Attractive and robust
The module frame made from torsion-proof, anodized aluminum meets the highest requirements in terms of stability and corrosion resistance. The aluminum frame was structurally optimized; the use of drainage holes inside the frame prevents possible damage due to frost.

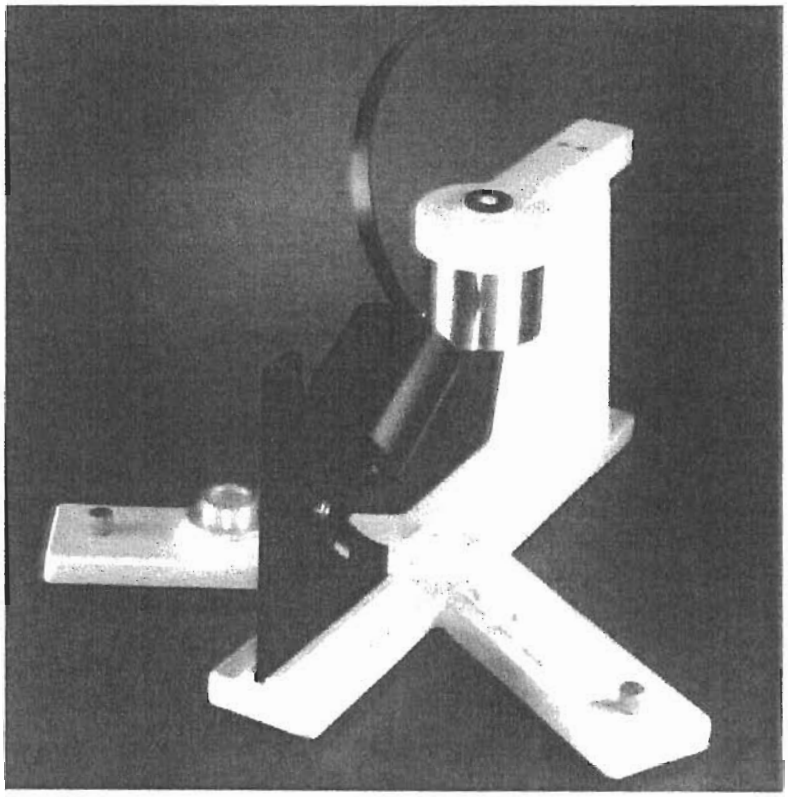
SMAU-1 modules can be installed with installation components from the Schüco SolarEZ Mounting System.

SCHÜCO

Rotating shadowband

Radiometer

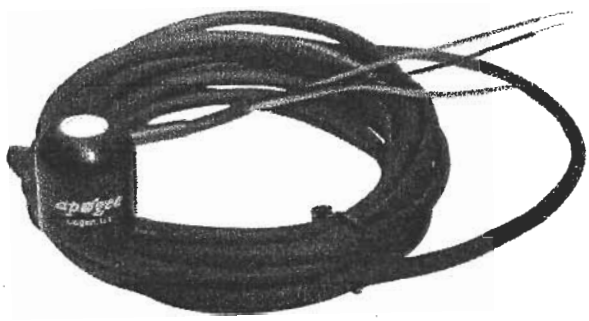
MFR -7



AMPLIFIED PYRANOMETER

SP-212 & 215

MEASURES SHORTWAVE RADIATION REACHING THE EARTH'S SURFACE.



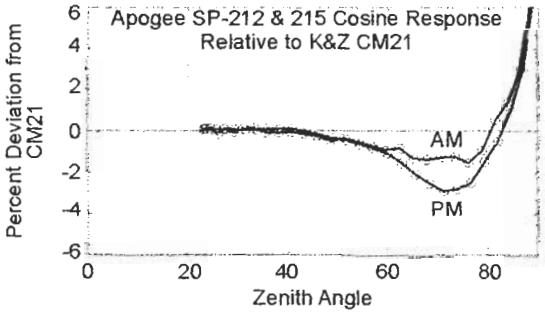
DESCRIPTION

Amplified pyranometers are the amplified versions of our SP-110 and come in 2.5 and 5 volt variants which allow for applications with less precise measuring capability.

This sensor is a silicon-cell pyranometer. It is calibrated to measure total shortwave radiation. The evaporation of water from soil and the transpiration of water from plant leaves are partly determined by the intensity of shortwave radiation, which is measured in Joules per meter squared per second or Watts per meter squared.

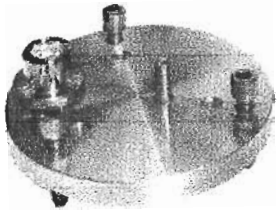
A cosine-corrected sensor is designed to maintain its accuracy when radiation comes from different angles. For pyranometers, the test of cosine response is to measure extreme zenith angles.

The cosine response and accuracy of the Apogee pyranometer have met with the high standards of Campbell Scientific, one of the world's leaders in environmental measurements.



Campbell Scientific installs Apogee Pyranometers on certain weather stations such as the ET106 and other data collection systems.

RECOMMENDED ACCESSORIES



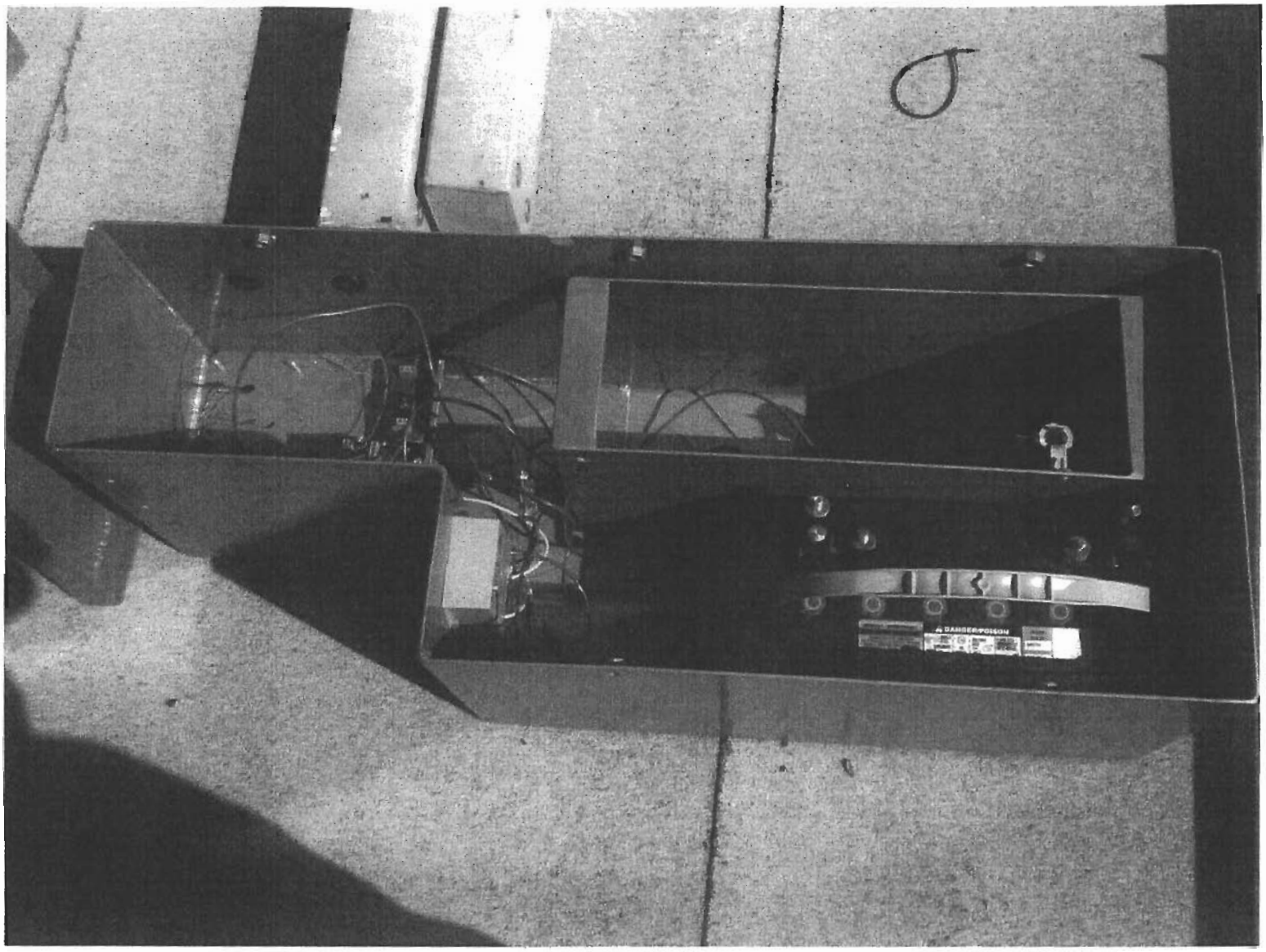
AL-100 A leveling plate used to keep the sensor head level.

ORDERING INFORMATION

All products can be ordered at www.apogeeinstruments.com

For technical information contact techsupport@apogee-inst.com

CCC Exhibit C
(page 6 of 8 pages)



SOLAR ELECTRONICS &
BATTERY BAY

CCC Exhibit C
(page 7 of 8 pages)

General Description

The C328R is VGA camera module performs as a JPEG compressed still camera and can be attached to a wireless or PDA host. Users can send out a snapshot command from the host in order to capture a full resolution single-frame still picture. The picture is then compressed by the JPEG engine and transferred to the host thru serial port.

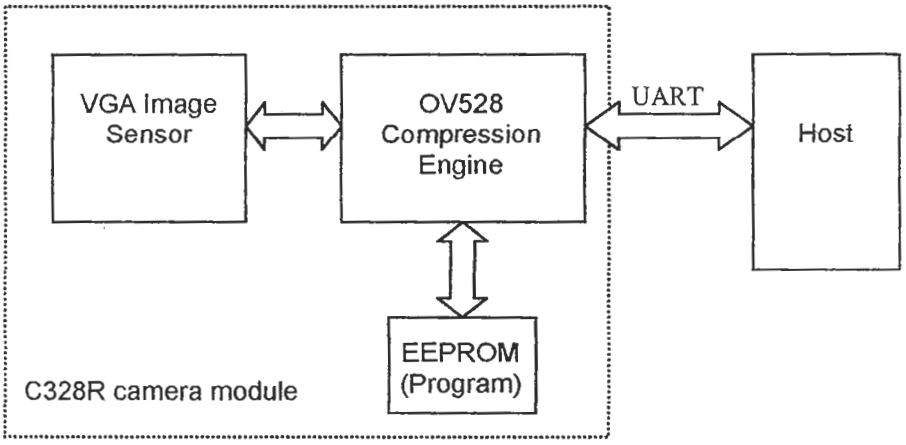


Figure 1 – System block diagram

Features

- Small in size, 20x28mm
- VGA resolution, down sample to QVGA or CIF
- 3.3V operation
- Low power consumption 60mA
- User friendly commands to control the module
- UART interface of up to 115.2Kbps
- Auto detect baud rate and make connection to the host
- Power saving mode
- Various lens options

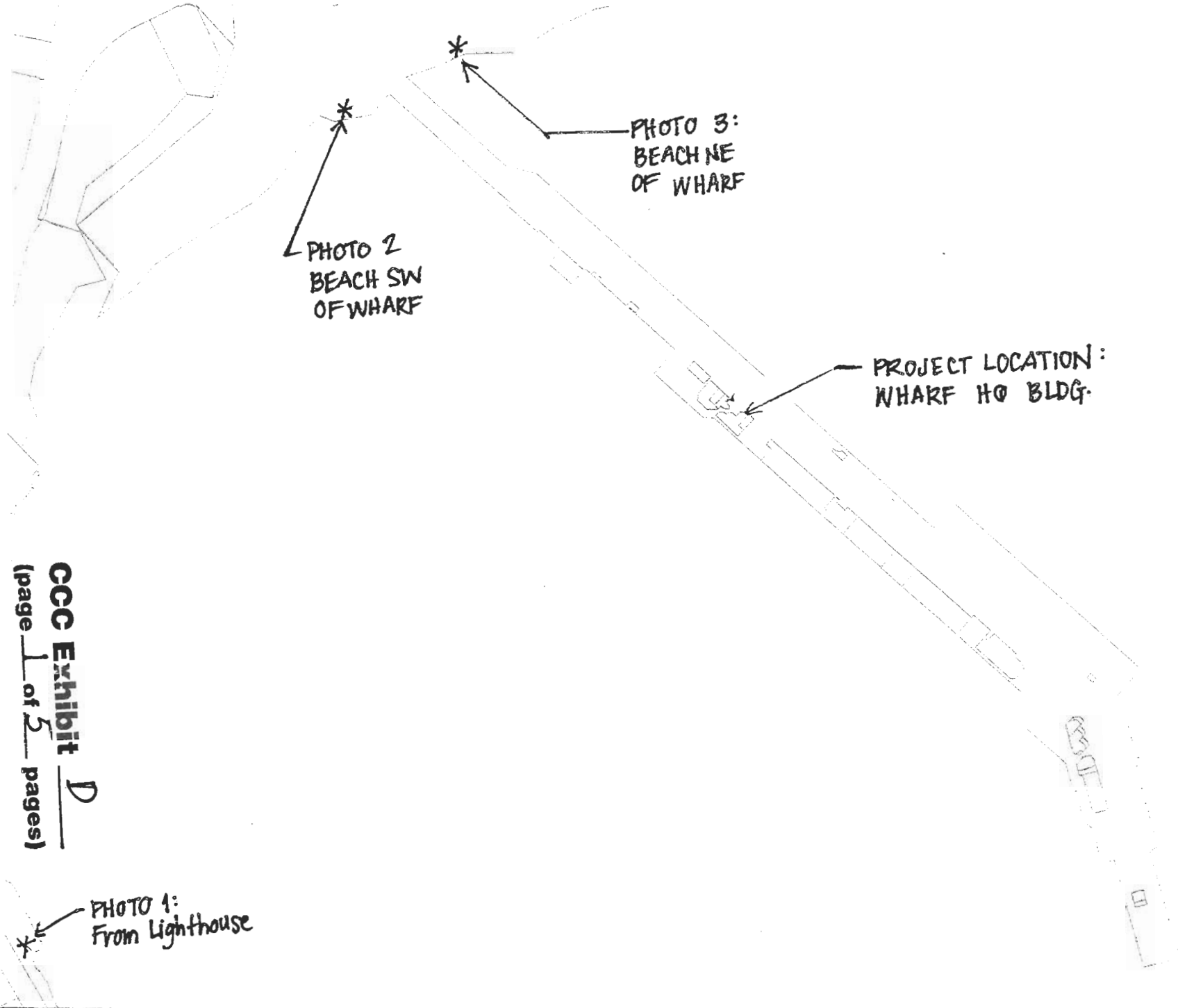
System Configuration

1. Camera Sensor
   The C328R module uses OmniVision VGA color digital CameraChips with an 8-bit YCbCr interface.

2. OV528 Serial Bridge
   The OV528 Serial Bridge is a JPEG CODEC embedded controller chip that can compress and transfer image data from CameraChips to external device. The camera interface synchronizes with input video data and performs down sampling, clamping and windowing functions with desired resolution, as well as color conversion that is requested by the user through serial bus host commands.
   The JPEG CODEC can achieve higher compression ratio and better image quality for various image resolutions.

3. Program EEPROM
   A serial type program memory is built-in for C328R to provide a set of user-friendly command interfacing to external host.

CCC Exhibit C
(page 8 of 8 pages)



CCC Exhibit D
(page 1 of 5 pages)

SANTA CRUZ WHARF

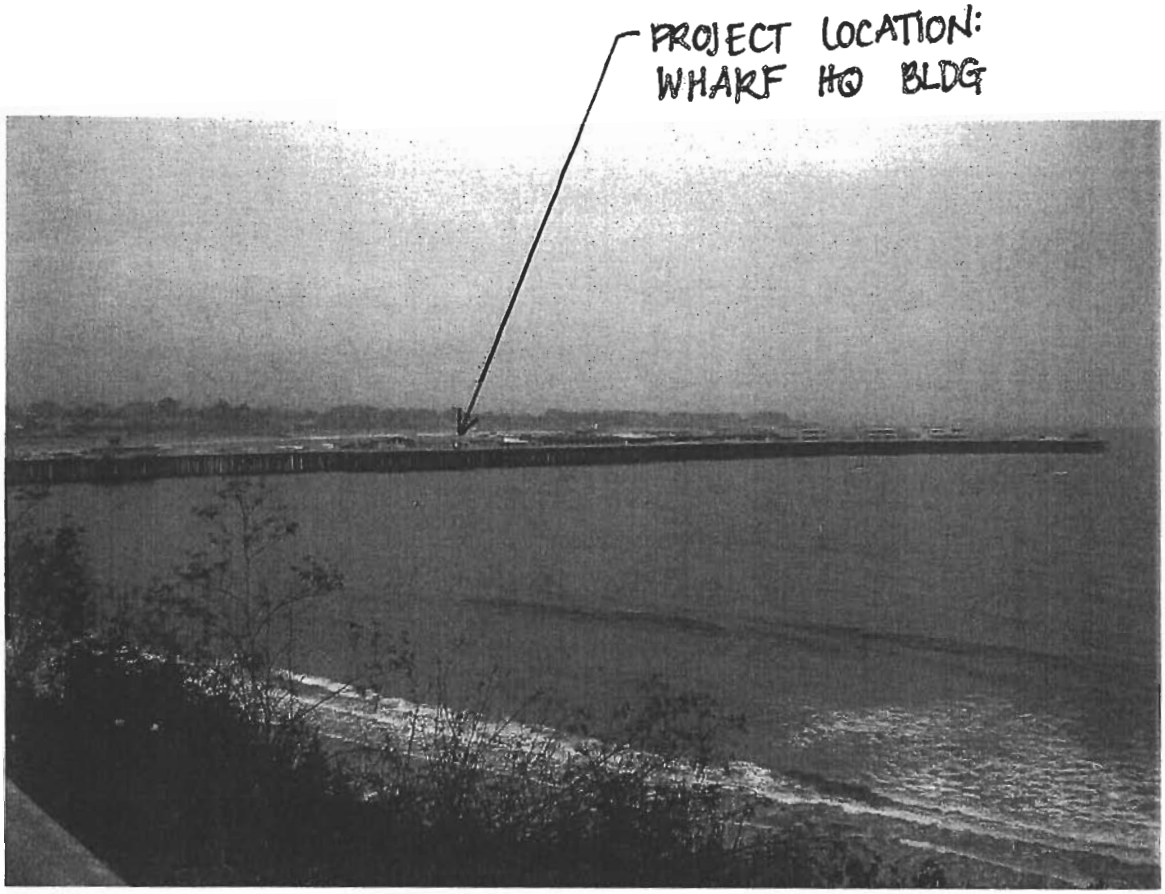


PHOTO 1:
VIEW OF WHARF FROM LIGHTHOUSE

CCC Exhibit D
(page 2 of 5 pages)

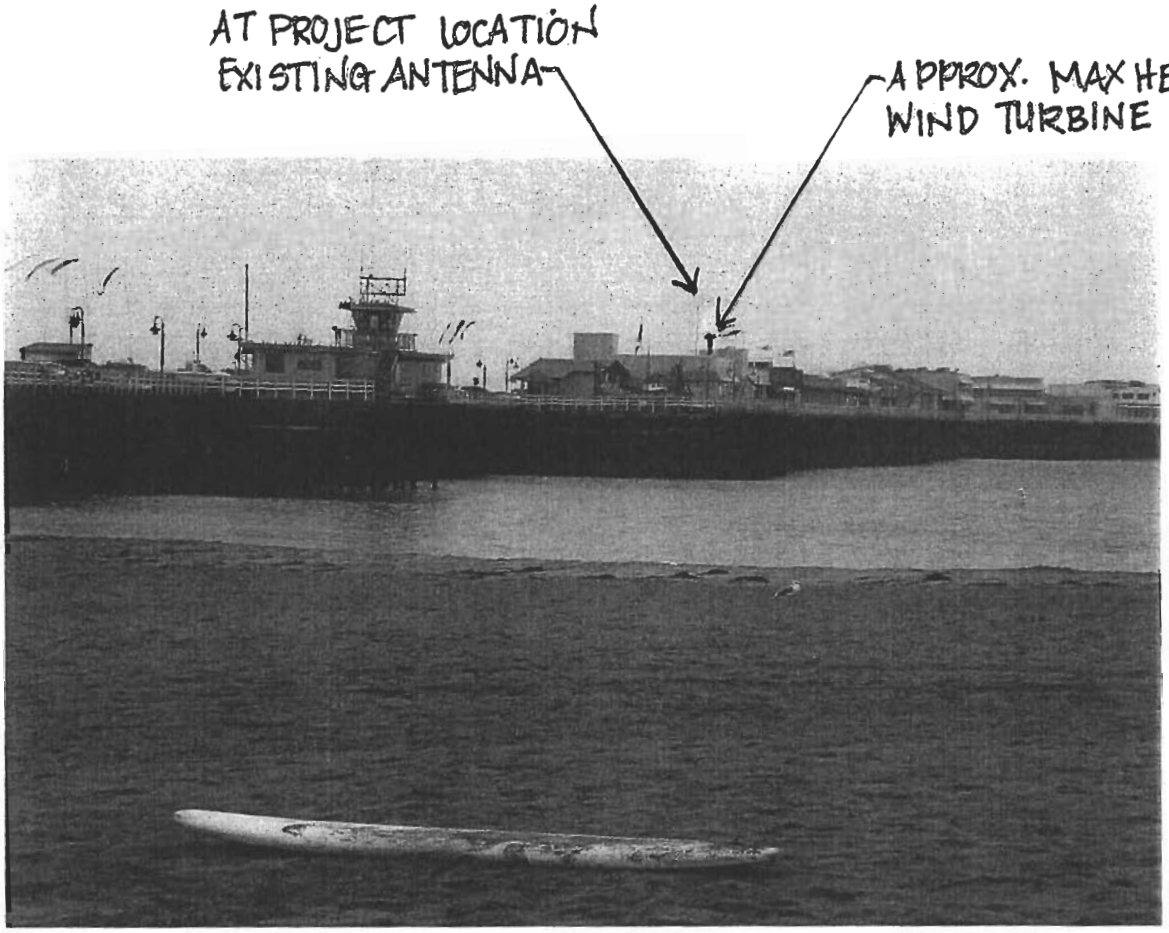


PHOTO 2:

WHARF VIEW FROM SW BEACH

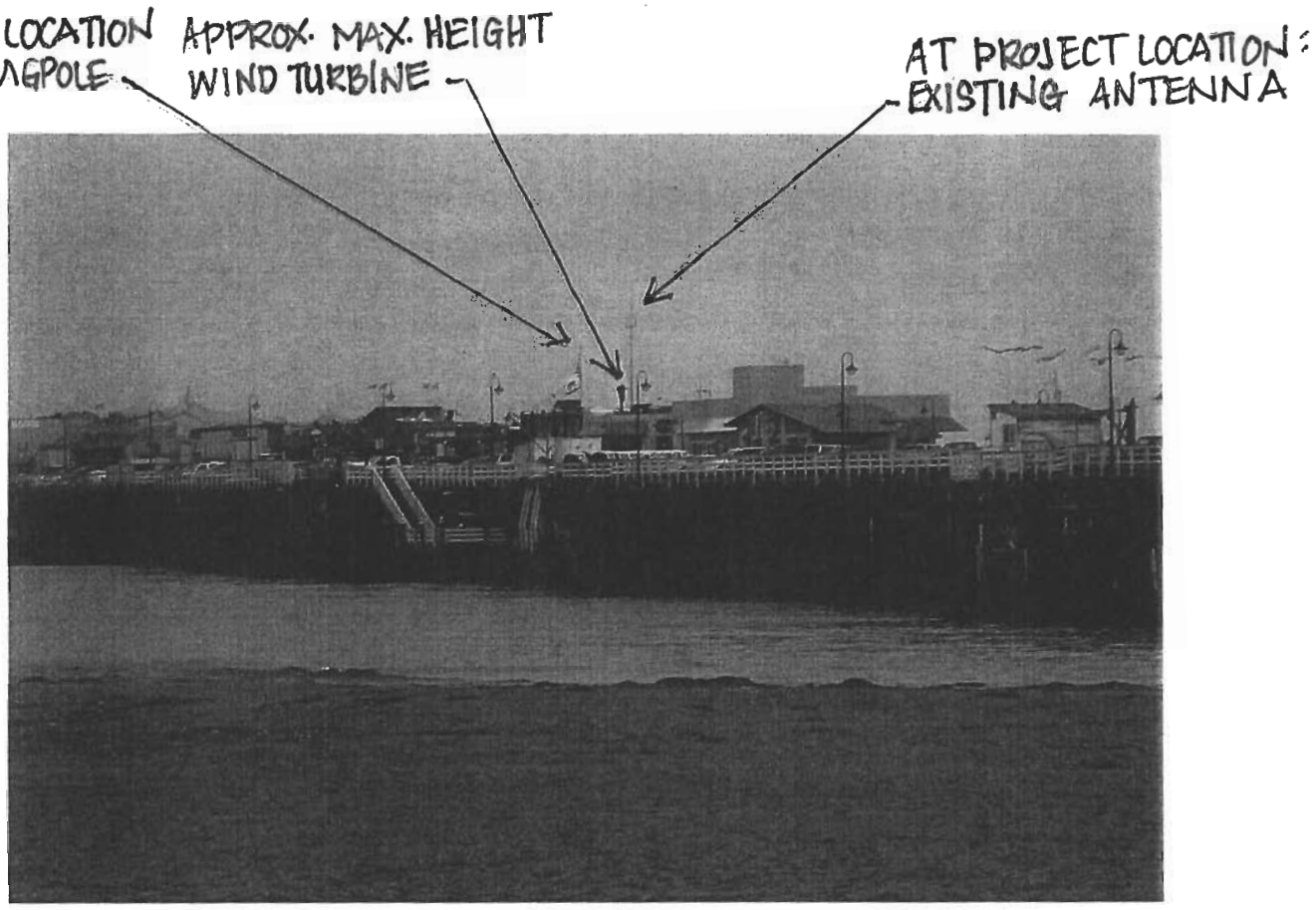
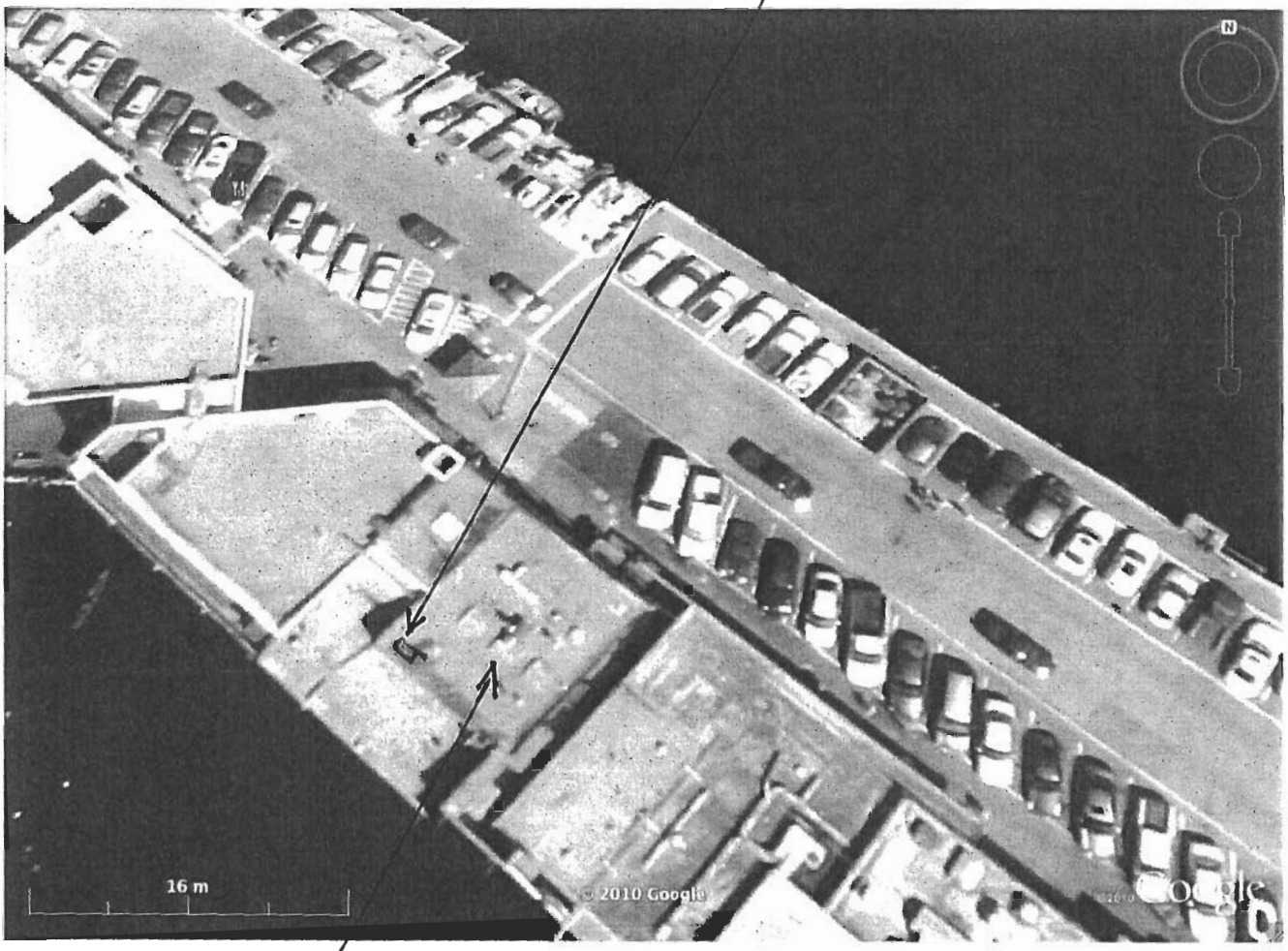


PHOTO 3:

WHARF VIEW FROM NE BEACH

PROPOSED 12'x8' EQUIPMENT PLATFORM LOCATION.



WHARF HQ BLDG. ROOF
scale noted

CCC Exhibit D
(page 5 of 5 pages)

Table ASP-6

Wharf Design Criteria

Architectural Criteria:

The intent of these guidelines is to ensure that all development on the wharf contributes to making it a unique and special place. Five basic principles are to be followed:

★Responsibleness to the marine surroundings;
★Creation of a pleasant pedestrian atmosphere;
★Maintenance of small-scale buildings;
★Reflection of the wharf's diversity; and
★Achievement of a unified wharf complex.

Goals	Policies	Actions/Criteria
1. Preservation and Reinforcement of the Wharf's Unique Identity		
▪ Greater awareness of wharf throughout Santa Cruz.	♦ Clarify and identify routes to wharf along major traffic arteries.	▸ Introduce prominent directional signs along traffic routes. ▸ Design directional signs to include distinctive wharf logo.
	♦ Enhance visibility of wharf from shore.	▸ Paint handrails white. ▸ Increase use of white and bright colors. ▸ Allow second story on selected buildings to vary wharf's profile. ▸ Establish distinctive lighting scheme. ▸ Encourage neon signs. ▸ Introduce clusters of flagpoles at significant deck areas.
	♦ Clarify wharf entrance.	▸ Replace parking in center of intersection with landscaped area. ▸ Introduce major piece of civic sculpture at wharf entrance. ▸ Establish strolling and sitting area in first 200 yards of wharf approach zone.
	♦ Promote a greater awareness of the wharf's role in local history.	▸ Promote studies of local nautical history for use in newspapers and tourist publications, and for exhibition in public buildings and on the wharf. ▸ Encourage the display of local historical material, particularly newspapers, photographs and artifacts. ▸ Promote businesses that deal in nautical artifacts and marine antiques. ▸ Direct amusement-type activities to Boardwalk area. ▸ Direct professional offices, large-scale shops, general merchandise stores, etc. to more suitable downtown or shopping center locations.

CCC Exhibit E
(page 1 of 8 pages)

Goals	Policies	Actions/Criteria
	♦ Develop a distinctive and coherent architectural vocabulary.	▸ Encourage designs that are clear and straightforward; avoid both banality and ornateness. ▸ Use appropriate materials such as horizontal wood siding, clapboards, corrugated metal and stucco; avoid monumental and opulent materials. ▸ Use building roofs as design elements. ▸ Establish fenestration pattern which promotes views into and through buildings. ▸ Require use of bright colors and unifying white trim.
	♦ Maintain historic continuity and physical fabric of the wharf.	▸ Limit new construction to areas of wharf expansion. ▸ Allow demolition and subsequent redevelopment only when no other alternative is available. ▸ Encourage display of local historical material, particularly newspapers, photographs and artifacts.
	♦ Develop a bright, colorful and lively seaside atmosphere.	▸ Preserve significant views on all sides of the wharf. ▸ Require use of light and bright colors. ▸ Encourage sidewalk activity such as strolling, window-shopping and eating. ▸ Allow flags and banners as a means of signing. ▸ Encourage signs painted directly on building walls.
	♦ Preserve and enhance views from the wharf.	▸ Establish significant view corridors where future building will be prohibited. ▸ Maintain leeward (i.e., northeast) side of wharf free from buildings. ▸ Require new buildings to allow views through interior to scenery beyond. ▸ Allow use of roof decks in commercial areas. ▸ Prohibit large motor homes and recreational vehicles with height and bulk which obstruct views to shore.
■ Greater awareness of wharf uses and processes by wharf uses.	♦ Establish graphic design system for use by the wharf management and tenants on the wharf and elsewhere.	▸ Create wharf logo for all directional signs on and off the wharf and for use by wharf businesses in advertising. ▸ Coordinate graphic theme in newspaper and tourist materials. ▸ Standardize regulatory signing. ▸ Provide signpost near wharf entrance as significant design element indicating wharf activities.
	♦ Articulate and make more effective all graphic communication by private groups on wharf.	▸ Integrate signing with architectural design. ▸ Encourage neon signs. ▸ Encourage diversity among business signs. ▸ Encourage advertising signs and logos painted directly on building walls.

CCC Exhibit E
(page 2 of 8 pages)

Goals	Policies	Actions/Criteria
	♦ Choose businesses and activities exhibiting maximum potential for visual interest.	▸ Encourage businesses to display merchandise, activities and processes (e.g., candy-making, food preparation, boat unloading). ▸ Introduce businesses contributing directly to sidewalk activity, such as sidewalk cafés and open market stalls.
	♦ Use design elements to distinguish use areas along wharf.	▸ Articulate fishing and crabbing areas by architectural detailing. ▸ Require building designs to display building activities. ▸ Require substantial portions of interiors of new buildings to be visible from sidewalk. ▸ Improve signing at significant use areas, e.g., public landing, fish market davits, boating deck space. ▸ Enlarge and articulate deck area for charter fishing landing and sinks.
2. The Wharf as Community Resource		
▪ Promotion and management of the wharf as a community investment.	♦ Actively seek desirable businesses and activities not presently existing on wharf.	▸ Solicit businesses which can contribute to the wharf community by serving both visitors and existing businesses, e.g., small bakery, candy shop, ice cream parlor. ▸ Build and manage open market area between bents 35 and 75 for both long- and short-term tenancy.
	♦ Encourage use by a wide spectrum of the City's population.	▸ Introduce shops selling marine-related merchandise, e.g., nautical antiques, books and charts, models and toys. ▸ Introduce less formal eating and entertainment facilities, e.g., delicatessen, snack bar, coffee house. ▸ Introduce new attractions into already existing businesses, e.g., dancing and entertainment in restaurants. ▸ Improve and increase low-cost and free activities on wharf, e.g., fishing, crabbing, picnicking, boating.
▪ Greater use of wharf during off-season and off-hours.	♦ Improve night-time ambience on wharf.	▸ Improve lighting scheme of wharf. ▸ Introduce lighting system relating to wharf businesses and pedestrian areas. ▸ Introduce night guard. ▸ Encourage more late evening activity (e.g., coffee house, pub, entertainment and dancing in restaurants, fishing and crabbing).
	♦ Promote wharf as year-round commercial and recreational center.	▸ Choose new businesses and activities with year-round and day-long appeal. ▸ Choose new businesses for their interest to local residents rather than for their attractiveness to tourists.

Goals	Policies	Actions/Criteria
▪ Intense and diverse pedestrian activity.	♦ Develop an attractive pedestrian environment on wharf.	▸ Increase amount of pedestrian space serving wharf buildings. ▸ Introduce more pedestrian amenities — walkways, lighting, benches, auto-free common spaces, pedestrian drop-offs, etc. ▸ Require business signing to address pedestrians. ▸ Separate and articulate vehicular and pedestrian circulation systems. ▸ Extend the pedestrian space into entrances of buildings greater than 20 feet deep. ▸ Introduce businesses contributing directly to sidewalk activity such as sidewalk cafés, market stalls and snack bars.
	♦ Preserve and improve views to and from wharf.	▸ Preserve significant views from wharf in all directions. ▸ Establish distinctive lighting scheme. ▸ Paint handrails white. ▸ Require substantial use of white and bright colors. ▸ Allow second stories on selected buildings to vary wharf's profile. ▸ Construct visually-prominent "theme building" on new deck space near end of wharf. ▸ Require new buildings to allow views through interior to scenery beyond. ▸ Prohibit large motor homes and recreational vehicles with height and bulk which block views to shore.
	♦ Choose new businesses and activities which can contribute to a rich pedestrian scene.	▸ Introduce businesses contributing directly to sidewalk activity, such as sidewalk cafés or open market stalls. ▸ Choose new businesses which can display merchandise, activities and processes to pedestrians (e.g., candy-making, sail-making). ▸ Require views into buildings from adjacent sidewalk.
▪ Diversity of access to an on wharf.	♦ Ensure adequate and diverse transportation to and on wharf.	▸ Establish prominent SCMTD bus stop near wharf entrance. ▸ Introduce open tram on pedestrian promenade, linking wharf to beach and Boardwalk. ▸ Separate and articulate vehicular and pedestrian circulation system. ▸ Improve service and delivery systems. ▸ Build major public landing for boat access beneath new deck area.
	♦ Ensure access for the handicapped on wharf.	▸ Require that all new construction conform to specifications of State's "Physically Handicapped Law". ▸ Provide adequate parking for handicapped on wharf.

Goals	Policies	Actions/Criteria
▪ Continued predominance of small-scale businesses.	♦ Protect and continue scale of existing businesses.	▸ Limit size of allowable commercial space to 7,000 gross sq. ft. for restaurants and 2,500 gross sq. ft. for other businesses. ▸ Place primary emphasis on businesses of up to 1,200 sq. ft. in area. ▸ Avoid establishment of large franchise-type business operations. ▸ Place primary emphasis on local ownership and management of new businesses.
	♦ Maintain continuity among long-time wharf tenants.	▸ Give present tenants right of first refusal on City terms for lease renewal. ▸ Support an active Wharf Lessees' Association. ▸ Avoid introducing new businesses which threaten the overall economic health of the wharf.

3. The Wharf as Regional Attraction

▪ Integration of wharf, beach and Boardwalk into a coherent coastal recreational area.	♦ Facilitate ease of access and parking for wharf.	▸ Develop traffic and parking plan involving entire wharf, beach and Boardwalk area. ▸ Introduce open tram system separate from vehicular traffic linking wharf, beach and Boardwalk. ▸ Integrate pedestrian and tram circulation among wharf, beach and Boardwalk. ▸ Clarify regulatory and directional signing both on and off wharf.
	♦ Establish clear visual relationship among wharf, beach and Boardwalk.	▸ Preserve views between wharf and Boardwalk. ▸ Use similar detail elements to articulate pedestrian and tramways linking wharf, Beach Street, and Boardwalk. ▸ Introduce common lighting theme linking the wharf and Beach Street.
	♦ Choose businesses and activities to complement rather than duplicate those on beach and Boardwalk.	▸ Restrict amusement functions to Boardwalk area. ▸ Relocate restrooms near wharf entrance to a public cabana in the beach area.
▪ Intense and diverse marine-oriented pedestrian activity.	♦ Develop wharf as an attractive pedestrian environment within a coastal setting.	▸ Increase amount of pedestrian space serving wharf buildings. ▸ Introduce more pedestrian amenities — walkways, lighting, benches, auto-free common spaces, pedestrian drop-offs, etc. ▸ Require business signing to address pedestrians. ▸ Separate and articulate vehicular and pedestrian circulation systems. ▸ Extend the pedestrian space into entrances of buildings greater than 20 feet deep. ▸ Introduce businesses contributing directly to sidewalk activity such as sidewalk cafés, market stalls and snack bars.

Goals	Policies	Actions/Criteria
		▸ Future wharf uses shall be selected using the following guidelines: (a) Area need for public access shall be set aside prior to leasing of wharf space not currently occupied and approval of adjacent development. (b) Existing space available for commercial fishing, recreational fishing, fish sales, boat launching, or chartering, public access, and public safety shall not be reduced but may be relocated if it better serves those uses.
	♦ Preserve and improve views both to and from the wharf.	▸ Preserve significant views from wharf in all directions. ▸ Establish distinctive lighting scheme. ▸ Paint handrails white. ▸ Require substantial use of white and bright colors. ▸ Allow second stories on selected buildings to vary wharf's profile. ▸ Construct visually-prominent "theme building" on new deck space near end of wharf. ▸ Require new buildings to allow views through interior to scenery beyond. ▸ Prohibit large motor homes and recreational vehicles with height and bulk which block views to shore.
	♦ Choose wharf businesses and activities which can contribute to a rich pedestrian scene.▸ Introduce businesses contributing directly to sidewalk activity, such as sidewalk cafés or open market stalls.	▸ Choose new businesses which can display merchandise, activities and processes to pedestrians (e.g., candy-making, sail-making). ▸ Require views into buildings from adjacent sidewalk.
	♦ Improve night-time ambience of wharf.	▸ Improve lighting scheme on wharf. ▸ Introduce lighting system relating to wharf businesses and pedestrian areas. ▸ Introduce night guard. ▸ Encourage more late evening activity (e.g., coffee house, pub, entertainment and dancing in restaurants, fishing and crabbing).
■ Increased tourist spending.	♦ Increase revenue-producing potential of sidewalk areas.	▸ Widen sidewalk area serving businesses and increase amenities along it. ▸ Increase number of commercial areas serving sidewalk directly. ▸ Introduce lighting system related to sidewalk area serving businesses.
	♦ Guarantee convenient access to wharf businesses.	▸ Improve vehicular circulation and clarify parking layout on wharf. ▸ Build auto drop-offs along widened sidewalk. ▸ Widen sidewalk areas serving businesses and add appropriate pedestrian amenities. ▸ Introduce open tram separate from vehicular traffic and linking wharf entrance and commercial areas.

Goals	Policies	Actions/Criteria
	♦ Provide increased commercial opportunities during peak use periods.	▸ Introduce open market stalls in areas near shore to attract business from beach-goers during vacation seasons.
4. The Wharf as Marine Resource		
▪ Enhanced marine and recreational atmosphere.	♦ Encourage additional fishing and crabbing.	▸ Build additional deck space at wharf's end for fishing and crabbing. ▸ Add lowered fishing deck space alongside existing fishing pier at wharf's end. ▸ Introduce fishing "bays" along parking area between bents 112 and 145.
	♦ Encourage increased boating activity.	▸ Build additional public landing space below wharf deck. ▸ Label public landings prominently, adding signs at both deck and sub-deck levels. ▸ Establish semi-protected mooring area at wharf's leeward side for commercial and recreational boaters.
	♦ Encourage commercial uses appropriate to a marine setting.	▸ Choose new businesses which are marine- and/or leisure-oriented (e.g., chandlery, sailmaker, nautical book and chart store).
	♦ Protect marine environment.	▸ Avoid introducing new activities potentially harmful to marine life.
▪ Expanded awareness of marine resources and ocean-related uses by wharf visitors.	♦ Expand opportunities for experiencing marine environment.	▸ Exploit opportunities to view marine plant and animal life in their natural habitat. ▸ Encourage businesses to include public areas which can serve the purpose of a maritime museum (as at Spenger's Restaurant in Berkeley). ▸ Expansion of uses which require physical access to the water, such as boating and fishing, shall be provided as part of any wharf decking extension. Adequate support areas for such uses (boat hoist, fish cleaning areas) shall be assured.
	♦ Make areas of marine activity more apparent.	▸ Expand deck area opposite Wharf Headquarters to serve boating activities. ▸ Improve signing at boating areas. ▸ Articulate fishing areas along pedestrian routes.
▪ Continued historic tradition of working wharf.	♦ Continue physical pattern that has grown with wharf.	▸ Restrict commercial activity to windward side, leaving leeward open for fishing and boating.
	♦ Encourage and publicize commercial boating and fishing activities.	▸ Consolidate commercial boating activities in enlarged deck area opposite Wharf Headquarters; add new landing space beneath. ▸ Enlarge and articulate deck area for charter fishing landing and sinks. ▸ Improve signing at commercial boating area. ▸ Establish semi-protected mooring area at wharf's leeward side. ▸ Renovate existing fish markets while retaining original design qualities to include counters serving sidewalk, large glazed areas in coffee shops, large wall paintings and neon signs.

Goals	Policies	Actions/Criteria
		▸ Maintain and make more visible fish handling functions presently occurring in existing middle area of wharf.
	♦ Develop architectural vocabulary appropriate to working wharf.	▸ Encourage designs that are clear and straightforward; avoid both banality and ornateness. ▸ Use appropriate materials such as horizontal wood siding, clapboards, corrugated metal and stucco; avoid monumental and ornate materials. ▸ Choose uses which are compatible with the traditions of a working wharf; avoid extremes of overelegance and cheap honky-tonk.
5. Service and Security on the Wharf		
▪ Reduced vandalism and theft.	♦ Improve night-time ambience on wharf.	▸ Improve overall lighting scheme. ▸ Introduce lighting system increasing amount of light near businesses and vulnerable pedestrian areas. ▸ Introduce night guard. ▸ Encourage greater night-time use of wharf by introducing late evening activities such as entertainment and dancing.
	♦ Increase informal surveillance of all wharf areas.	▸ Provide potential for activity at all public wharf areas. ▸ Increase amount of commercial frontage opening onto pedestrian and common spaces.
▪ Efficient operation of service and emergency functions.	♦ Ensure ease of access for service and emergency vehicles.	▸ Build previously proposed emergency access lane, extending it past fish market area to fishing pier at end of wharf. ▸ Provide access between roadway and emergency access lane. ▸ Provide turnaround for emergency access lane at area between Looks Den and Cardinale's Seafood. ▸ Ensure sufficient turnaround space for delivery and emergency vehicles.
	♦ Reduce number of conflicts between pedestrian areas and service zones such as trash bins, delivery zones and parking area.	▸ Consolidate trash collection areas, both for tenant and for visitor use. ▸ Provide visual barriers between pedestrian and service zones where necessary. ▸ Make crosswalk areas highly visible to vehicular traffic, and reduce crosswalk length as much as possible. Establish crosswalks as part of overall pedestrian plan.
	♦ Improve vehicular access and parking situation on wharf.	▸ Standardize parking system to 8'6" stalls at 60°. Replace parallel parking with 60° angled parking wherever possible. ▸ Establish drop-off zones along sidewalks to help prevent double parking. ▸ Prohibit large motor homes and recreational vehicles which inhibit traffic movement and reduce parking capacity.