# TRANSBAY TRANSIT CENTER

## Sustainability Presentation

November 18. 2008

atelier ten

## TRANSBAY SUSTAINABILITY TEAM

- Atelier Ten – Sustainability team lead; water; emissions
- BVM Engineering – LEED program management
- Buro Happold – Mechanical concept design, passive design
- WSP Flack + Kurtz– Mechanical engineering
- Rana Creek – Ecology; vegetative water filtration

- Pelli Clarke Pelli
- Adamson Associates
- Peter Walker & Partners
- Aurbach Glasgow French
- Arup
- Israel Berger

- Simon & Associates
- URS

# SUSTAINABILITY AMBITIONS IN CALIFORNIA AND SAN FRANCISCO: Where will we be in the year 2014?

- California is a model state for sustainability; San Francisco is a model city; and Transbay is a model project within the city and state.

- Transbay Transit Center must be a model for sustainability as well as an architectural icon.

- Transbay can achieve this status through integrated design and a focus on the sustainability issues that are a priority for this project.

- How high do we need to aim, and what is our road map? We can look to guidelines and goals, looking towards the years 2014 (when the building opens) and 2020 (when it is at its peak use). We need to plan to be a model project then, not just now.

# TRANSBAY GOALS: ENERGY

- Minimum goal: Meet LEED prerequisites for energy performance (reduces energy cost by 14% compared to ASHRAE 90.1-2004.)
- Proposed stretch goal: Meet the Architecture 2030 plan for the year 2014. This goal can be met using several different metrics; the metric to be used to TTC is to be determined.

- Major design strategies & options:
  - HVAC and lighting design criteria
  - facades, skylights, and atria
  - conditioning systems & controls
  - energy systems
  - lighting systems & controls
  - renewable energy systems
  - possible district system connections

- Life-cycle costing

# TRANSBAY GOALS: WATER

- Minimum goal: 40% potable water use reduction in accordance with the LEED calculation methodology; earn WEc1: Water Efficient Landscaping; meet City guidelines for stormwater management.
- Proposed goal: Do not use potable water where non-potable water could be used

- Water is related to energy. Synergies between water conservation and energy conservation should be explored.
- Off-site impacts of water use should be considered, including the impacts and energy use needed to get water from its source to San Francisco.
- Water is related to habitat & heat island effect mitigation; synergies between these should be explored.

- Design strategies & options:
  - water conserving fixtures in bathrooms and commercial kitchens
  - use of native vegetation & high-efficiency irrigation systems
  - reuse of stormwater, greywater, and/or blackwater
  - possible use of ground water
  - cooling tower water conservation
  - ground level design & irrigation
  - possible district system connections

# TRANSBAY GOALS: OTHER KEY GOALS

## VISIBILITY & EDUCATION

- As a high profile public project, education should be important consideration in the design. Highly visible sustainable strategies (e.g., green roof, PV panels) will be considered, along with other strategies like real-time data, environmental art, etc.

## WASTE

- San Francisco has a goal of achieving zero waste by 2020, and the SF Green Building Ordinance requires space for three-stream waste management. Grease recycling for restaurant waste will be supported in the Terminal.

## CARBON TRADING

- The Chicago Climate Exchange (CCX) is interested in the possibility of using the Transbay Terminal as a pilot project for building-scale carbon trading.

## DISTRICT SYSTEM OPPORTUNITIES

- As the neighborhood around Transbay Terminal develops, there may be an opportunity for district-scale energy and/or water systems. The Transbay team will work with the City on these issues.

# LEED STATUS

- The Terminal must achieve at least a LEED Silver rating. The project will aim for a Gold rating.

- The team currently estimates the Terminal at a high Silver rating under LEED-NC 2.2 and high Silver/low Gold under LEED 2009.

- The Terminal is registered under LEED-NC version 2.2.

- The team is also benchmarking the project against LEED 2009, but the final version of LEED 2009 has not yet been released.

- Key issues for this building type include:
  - Naturally ventilation can be very energy-efficient, but is not currently accounted for the energy modeling methodology used by LEED.
  - There will be special LEED considerations for the retail spaces.

# LEED SCORECARD – SUSTAINABLE SITES

| Yes | Likely | Maybe | Not Likely | No | Levels: Certified 26-32 pts Silver 33-38 pts Gold 39-51 pts Platinum 52-69 pts | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 23 | 15 | 21 | 5 | 5 | **Project Totals** (pre-certification estimates) | | | | |
| 6 | 6 | 1 | 1 | | **Sustainable Sites** | | 14 Pts | Credit Intent | Concept Validation Comments |
| Y | | | | | Prereq 1 | **Construction Activity Pollution Prevention** | Required | Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation. | |
| 1 | | | | | Credit 1 | **Site Selection** | 1 | Avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site. | |
| 1 | | | | | Credit 2 | **Development Density & Community Connectivity** | 1 | Channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources. | Should achieve exemplary performance on this |
| 1 | | | | | Credit 3 | **Brownfield Redevelopment** | 1 | Rehabilitate damaged sites where development is complicated by environmental contamination, reducing pressure on undeveloped land. | |
| 1 | | | | | Credit 4.1 | **Alternative Transportation**, Public Transportation Access | 1 | Reduce pollution and land development impacts from automobile use. | Should achieve exemplary performance on this |
| | 1 | | | | Credit 4.2 | **Alternative Transportation**, Bicycle Storage & Changing Rooms | 1 | see SS 4.1 above | depends on definition of FTEs and calculation of appropriate number of showers. Will be further investigated during |
| | | | 1 | | Credit 4.3 | **Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles | 1 | see SS 4.1 above | |
| 1 | | | | | Credit 4.4 | **Alternative Transportation**, Parking Capacity | 1 | Reduce pollution and land development impacts from single occupancy vehicle use. | |
| | 1 | | | | Credit 5.1 | **Site Development**, Protect or Restore Habitat | 1 | Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity. | |
| 1 | | | | | Credit 5.2 | **Site Development**, Maximize Open Space | 1 | Provide a high ratio of open space to development footprint to promote biodiversity. | |
| | 1 | | | | Credit 6.1 | **Stormwater Design**, Quantity Control | 1 | Limit disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff, and eliminating contaminants. | Required by the green building ordinance |
| | 1 | | | | Credit 6.2 | **Stormwater Design**, Quality Control | 1 | Limit disruption and pollution of natural water flows by managing stormwater runoff. | Required by the green building ordinance |
| | 1 | | | | Credit 7.1 | **Heat Island Effect**, Non-Roof | 1 | Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat. | Many strategies being reviewed |
| | 1 | | | | Credit 7.2 | **Heat Island Effect**, Roof | 1 | see SS 7.1 above | |
| | | 1 | | | Credit 8 | **Light Pollution Reduction** | 1 | Minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments. | |

# LEED SCORECARD – WATER EFFICIENCY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 1 | 1 | | | Water Efficiency | | 5 Pts | Credit Intent | Assessment Comments |
| 1 | | | | | Credit 1.1 | **Water Efficient Landscaping**, Reduce by 50% | 1 | Limit or eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation. | Required by Green Building ordinance |
| | 1 | | | | Credit 1.2 | **Water Efficient Landscaping**, No Potable Use or No Irrigation | 1 | Eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation. | |
| | | 1 | | | Credit 2 | **Innovative Wastewater Technologies** | 1 | Reduce generation of wastewater and potable water demand, while increasing the local aquifer recharge. | the overall water re-use concept is under investigation at this time. The project may re-use stormwater, graywater and/or blackwater. Separate piping supply systems are required for supply to flush fixtures |
| 1 | | | | | Credit 3.1 | **Water Use Reduction**, 20% Reduction | 1 | Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems. | |
| 1 | | | | | Credit 3.2 | **Water Use Reduction**, 30% Reduction | 1 | | see W 3.1 above |

# LEED SCORECARD – ENERGY & ATMOSPHERE

| 3 | 2 | 11 | 1 | | Energy & Atmosphere | | 17 Pts | Credit Intent | Assessment Comments |
|---|---|---|---|---|---|---|---|---|---|
| Y | | | | | Prereq 1 | Fundamental Commissioning of the Building Energy Systems | Required | Verify that the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents. | |
| Y | | | | | Prereq 2 | Minimum Energy Performance | Required | Establish the minimum level of energy efficiency for the proposed building and systems. | |
| Y | | | | | Prereq 3 | Fundamental Refrigerant Management | Required | Reduce ozone depletion. | |
| 2 | | 8 | | | Credit 1 | Optimize Energy Performance | 1 to 10 | Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use. | Two credits are required for certification; many different strategies for energy performance are being investigated some which will achieve LEED credit and some which may not. Careful review of T24, ASHRAE 90.1 and life cycle cost is occuring |
| | | 2 | 1 | | Credit 2.1 | On-Site Renewable Energy | 1 to 3 | Encourage and recognize increasing levels of on-site renewable energy self-supply in order to reduce environmental and economic impacts associated with fossil fuel energy use. | Project will include on-site renewable energy as, at least a demonstration project. LEED thresholds are high and the project has not determined the annual energy production and evaluated this credit at this time. |
| 1 | | | | | Credit 3 | Enhanced Commissioning | 1 | Begin the commissioning process early during the design process and execute additional activities after systems performance verification is completed. | |
| | 1 | | | | Credit 4 | Enhanced Refrigerant Management | 1 | Reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to global warming. | |
| | 1 | | | | Credit 5 | Measurement & Verification | 1 | Provide for the ongoing accountability of building energy consumption over time. | |
| | | 1 | | | Credit 6 | Green Power | 1 | Encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis. | |

# LEED SCORECARD – MATERIALS & RESOURCES

| 4 | 1 | 2 | 1 | 5 | Materials & Resources | | 13 Pts | Credit Intent | Assessment Comments |
|---|---|---|---|---|---|---|---|---|---|
| Y | | | | | Prereq 1 | **Storage & Collection of Recyclables** | Required | Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills. | specific requirements in Green Building ordinance will also be met including space for compostable waste |
| | | | | 1 | Credit 1.1 | **Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof | 1 | Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport. | careful review of the existing building will be made but achieving a 75% reuse does not coincide with the new program |
| | | | | 1 | Credit 1.2 | **Building Reuse**, Maintain 95% of Existing Walls, Floors & Roof | 1 | see MR 1.1 above | |
| | | | | 1 | Credit 1.3 | **Building Reuse**, Maintain 50% of Interior Non-Structural Elements | 1 | see MR 1.1 above | |
| 1 | | | | | Credit 2.1 | **Construction Waste Management**, Divert 50% from Disposal | 1 | Divert construction, demolition and land-clearing debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites. | required by the green building ordinance. Project must review how the existing building demolition will be accomplished |
| 1 | | | | | Credit 2.2 | **Construction Waste Management**, Divert 75% from Disposal | 1 | see MR 2.2 above | required by the green building ordinance. Project must review how the existing building demolition will be accomplished |
| | | | | 1 | Credit 3.1 | **Materials Reuse**, 5% | 1 | Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources. | |
| | | | | 1 | Credit 3.2 | **Materials Reuse**,10% | 1 | see MR 3.1 above | |
| 1 | | | | | Credit 4.1 | **Recycled Content**, 10% (post-consumer + ½ pre-consumer) | 1 | Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials. | |
| | | 1 | | | Credit 4.2 | **Recycled Content**, 20% (post-consumer + ½ pre-consumer) | 1 | see MR 4.1 above | |
| 1 | | | | | Credit 5.1 | **Regional Materials**, 10% Extracted, Processed & Manufactured | 1 | Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation. | |
| | | 1 | | | Credit 5.2 | **Regional Materials**, 20% Extracted, Processed & Manufactured | 1 | see MR 5.1 above | |
| | | | 1 | | Credit 6 | **Rapidly Renewable Materials** | 1 | Reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials. | |
| | 1 | | | | Credit 7 | **Certified Wood** | 1 | Encourage environmentally responsible forest management. | |

# LEED SCORECARD – INDOOR ENVIRONMENTAL QUALITY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 6 | 1 | 6 | 2 | | Indoor Environmental Quality | | 15 Pts | Credit Intent | Assessment Comments |
| Y | | | | | Prereq 1 | **Minimum IAQ Performance** | Required | Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants. | |
| Y | | | | | Prereq 2 | **Environmental Tobacco Smoke (ETS) Control** | Required | Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS). | |
| 1 | | | | | Credit 1 | **Outdoor Air Delivery Monitoring** | 1 | Provide capacity for ventilation system monitoring to help sustain occupant comfort and wellbeing. | |
| 1 | | | | | Credit 2 | **Increased Ventilation** | 1 | Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity. | |
| 1 | | | | | Credit 3.1 | **Construction IAQ Management Plan**, During Construction | 1 | Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants. | |
| | | 1 | | | Credit 3.2 | **Construction IAQ Management Plan**, Before Occupancy | 1 | See IEQ 3.2 above | |
| 1 | | | | | Credit 4.1 | **Low-Emitting Materials**, Adhesives & Sealants | 1 | Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants. | required by the Green building ordinance |
| 1 | | | | | Credit 4.2 | **Low-Emitting Materials**, Paints & Coatings | 1 | See IEQ 4.1 above | required by the Green building ordinance, careful attention will need to be paid because of some specific requirements of this project type |
| 1 | | | | | Credit 4.3 | **Low-Emitting Materials**, Carpet Systems | 1 | See IEQ 4.1 above | required by the Green building ordinance |
| | | 1 | | | Credit 4.4 | **Low-Emitting Materials**, Composite Wood & Agrifiber Products | 1 | See IEQ 4.1 above | |
| | | 1 | | | Credit 5 | **Indoor Chemical & Pollutant Source Control** | 1 | Minimize exposure of building occupants to potentially hazardous particulates and chemical pollutants. | Natural ventilation strategies may make this credit (filtration portion) challenging |
| | 1 | | | | Credit 6.1 | **Controllability of Systems**, Lighting | 1 | Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (i.e. classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants. | |
| | | | 1 | | Credit 6.2 | **Controllability of Systems**, Thermal Comfort | 1 | Provide a high level of thermal comfort system control by individual occupants or by specific groups in multi-occupant spaces (i.e. classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants. | |
| | | 1 | | | Credit 7.1 | **Thermal Comfort**, Design | 1 | Provide a comfortable thermal environment that supports the productivity and well-being of building occupants. | |
| | | 1 | | | Credit 7.2 | **Thermal Comfort**, Verification | 1 | Provide for the assessment of building thermal comfort over time. | |
| | | 1 | | | Credit 8.1 | **Daylight & Views**, Daylight 75% of Spaces | 1 | Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building. | |
| | | | 1 | | Credit 8.2 | **Daylight & Views**, Views for 90% of Spaces | 1 | See IEQ 8.1 above | |

# LEED SCORECARD – INNOVATION & DESIGN

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | | | | Innovation & Design Process | | 5 Pts | Credit Intent | Assessment Comments |
| | 1 | | | | Credit 1.1 | Innovation in Design: Exemplary Performance: Water-Use Reduction | 1 | To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED-NC Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED-NC Green Building Rating System. | There are many sustainable design elements included in this project which could result in achieving innovation credits. Many innovation credits will be targeted during the subsequent phases of design. It is anticipated that the project will achieve all Four possible innovation credits, as well as a few 'extra' which wouldn't count toward certification |
| | 1 | | | | Credit 1.2 | Innovation in Design: Exemplary Performance: Innovative Wastewater | 1 | | |
| | 1 | | | | Credit 1.3 | Innovation in Design: Exemplary Performance: certified wood | 1 | | |
| | 1 | | | | Credit 1.4 | Innovation in Design: exemplary performance: process water savin | 1 | | |
| 1 | | | | | Credit 2 | LEED® Accredited Professional | 1 | To support and encourage the design integration required by a LEED-NC green building project and to streamline the application and certification process. | |
| | | | | | | | | | |
| 23 | 15 | 21 | 5 | 5 | Project Totals (pre-certification estimates) | | 69 Pts | | |
| | | | | | Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points | | | | |