Track 3: Sustainable Infrastructure

I. **Sustainability in Infrastructure Rehabilitation**
II. **SMART Grid Strategy: Vision, Challenges and Solutions**
III. **Sustainability in Transportation**

1. Sustainability in Infrastructure Rehabilitation:

This session explored topics that included integrated decision-making, improved coating technology that limits corrosion damage, increasing the durability of certain pavement materials, reducing costs in water and electrical projects through distributed energy, and conserving energy and reducing maintenance in lighting systems.

Keynote:

Infrastructure Rehab: Past, Present and Future
Anthony Eggert, Commissioner, California Energy Commission
This presentation by the commissioner of the California Energy Commission showed how sustainability decision-making is continuing to become more integrated.

Panel:

Panelists:
Chair: Eliza Jane Whitman, Parsons
Gordon Johnson, Chief Engineer, The Metropolitan Water District of Southern California
Albert Gastelum, Assistant Manger of Water, Los Angeles Department of Water & Power
Greg Mayer, Deputy Director of SSIP, Wastewater Enterprise, San Francisco Public Utilities Commission

Innovations in Sewer Technology

Keith Hanks, City of Los Angeles
Los Angeles is searching for a lower cost way to rehabilitate nearly 65 miles of large sewers built in the 1920s, many of them noncircular and made with cast-in-place concrete. To that end, the city has been installing sand, resin, fiberglass composite slipliners, or nonstructural grout-supported PVC liners where workers can enter the system. The city has completed demonstration projects, emergency repairs, and one bid project that demonstrate rehabilitating sewers in place using those methods.

High Performance Coatings
Tony Hobbs, Tnemec Coatings
What's the annual cost of corrosion to America's infrastructure? The tab comes to $22.6 billion. Controlling that destruction requires selecting the right coating technology to protect substrates, maximize performance, extend lifecycle costs, and minimize maintenance expense. Yesterday's coating technology is not working in today's more challenging environment, which includes an aging infrastructure and limited funds. Years of exposure can break down the coating system. This presentation explored the latest innovations in coating systems and technology, which result in a longer life.

Asphalt Reuse in Pavement Rehabilitation and Preservation
Donald M. Matthews, Pavement Recycling Systems, ARRA, Caltrans PPTG
Reduced budgets, a demand for sustainable technologies, and a willingness to consider options have prompted agencies to develop alternative rehabilitation and preservation strategies for pavement. Because of their quest, some older products are gaining a new vitality, including both cold in-place and hot in-place recycling. Until just the last few years, their use has been confined to long rural highways with light traffic. Recent process improvements fueled by the demand for more cost- and energy-efficient systems have expanded their use to all types of infrastructure projects with paving issues for both urban environments and high-traffic areas. In another development, researchers have demonstrated that reclaimed asphalt pavement can serve as a high-performance substitute for conventional aggregates for use in both slurry and chip seals.

Effective Quality Lighting and Controls
Nancy Clanton, Clanton & Associates Inc.
There are many lost opportunities in infrastructure rehabilitation when projects are completed in technology and agency created silos. This session reviewed how lost opportunities can be turned into optimal opportunities when lighting and controls for all types of infrastructure are combined. This results in reliable light sources and two-way communication controls; together they greatly reduce energy use and maintenance while providing high level reliability.

2. SMART Grid Strategy: Vision, Challenges and Solutions:

This session addressed three challenges to the SMART Grid: public acceptance, cyber security and national synchronization. Utility companies have rejected SMART grids that have failed to win public support because they did not reduce energy costs. Meanwhile, utilities are struggling to establish a systems-architecture plan that accounts for cyber security, TOU pricing, integrated meter data and other data points. At the same time, the nation is attempting to identify a method of grid synchronization and demand response at a national scale.

New Technology Helps Conquer SMART Grid Challenges

Jeff Gooding, Southern California Edison

Utilities struggle with the rollout of the SMART grid for regulatory reasons, because of problems with systems and data integration and because of the unavailability of technology. This session focused on those utility infrastructure challenges while setting the stage for the Smart Grid Panel. Panelists, including technology suppliers and researchers, presented new technologies to help resolve these issues.

Alternative Energy and Higher Demand Will Change the Power Grid

Mani Chandy, California Institute of Technology

The power grid's architecture was developed over many years and worked reasonably through the 1990s. Today's grid, however, seems unsuitable for coming decades because it fails to address dynamic sources of power (e.g., solar) or greater variability in demand (e.g., electric cars' thirst for power). Nor does the grid exploit new sources of data such as synchrophasors and smart meters. This presentation explored Caltech's research, funded partly by Southern California Edison. The talk discusses how SMART grid requirements—particularly increases in the percentage of power from solar and wind—will influence the design of the grid and the information technology architecture that supports it.

SMART Grid Resilience - The Security Challenge

Kymie Tan, Jet Propulsion Laboratory

No abstract available.

Leveraging the SMART Grid through Energy Management

Randy Britt, Parsons

Effective energy management cuts utility bills and reduces the carbon footprint. The subject of this presentation, Active Demand Reduction Technology, incorporates Web-based energy curtailment controls with accurate time-of-use meter data provided by utility companies through advanced meter infrastructure/meter data management systems (AMI/MDMS)—or obtained via the Web if MDMS is not available. Systems and equipment in buildings can be controlled and monitored virtually through a series of wireless load devices

connected to a centralized hub. The wireless devices offer easy installation and lower cost than wired building management systems.

Wayside Energy Savings in DC Traction Systems
Mark McClintock, Parsons
Utilities endure high demand when a transit system reaches the top of its peak cycle during rush hour, but combing regeneration and moderating the schedule/performance substantially reduces rapid-transit power demand. Benefits of that reduction include lower consumption and a lower carbon footprint. Today's transit systems are schedule-driven instead of seeking energy constraint, which results in high peak demands for relatively low gain in travel time or passenger throughput. Schedules are not coordinated to make the most from regenerated braking energy. By applying computer simulation techniques, rapid-transit systems can develop and implement automatic control systems that reduce energy demands and afford a sustainable utility grid system. Modeling demonstrates that idea's viability.

Case Study of Advancements in Utility Network System
Paul DeMartini, Cisco
Utilities are deploying large-scale sensor and distributed control networks that are insufficiently secure and, in many cases, are not scalable. Cisco's distributed intelligence architecture adapts proven techniques to solve those issues and thus create an effective network of networks and establish a robust control plane to support emerging operational applications. This presentation highlighted Cisco's Smart Grid architecture for connecting millions of devices and the use of networking technology for system security, data management and analysis, and distributed decision making.

3. Sustainability in Transportation:

This session explored sustainability in operating, maintaining and retrofitting transportation infrastructure within three distinct sections:

Emerging technologies
Innovative approaches
Integrating sustainability in mega projects

Each speaker gave a 15- to 20-minute presentation, followed by a moderator-driven Q&A session. Panel members commented on the subject matter in which they have an interest or expertise.

Emerging Technologies:

Quantifying Economic Sustainability in Transportation Asset Management

Paul Thompson, International Expert in Bridge Management Systems

The leading developer of transportation infrastructure management systems presented on recent data collection and analysis developments to better meet the objectives of life cycle cost, condition, risk, safety, reliability, mobility, comfort, and community impacts. These improvements have placed the emphasis on developing management methods and organizational culture in tandem with technology adaptation to ensure the successful use of new technology for data collection and analysis.

Monitoring from Within: Development of a Pioneering Suspension Bridge Main Cable Monitoring System

Professor Raimondo Betti, Columbia University

Professor Betti discussed the development and calibration of a pioneering suspension bridge main cable monitoring system. This system incorporates state-of-the-art corrosion, humidity, temperature, and acoustic sensors to monitor the initiation, progression, and overall extent of corrosion within a main cable. This system offers suspension bridge owners with the first ever real-time health monitoring of their suspension bridge main cables, providing crucial information core to significantly minimizing overall cost and failure risk.

Don't Replace that Bridge!!

Peter Vanderzee, LifeSpan Technologies

Peter Vanderzee discussed how advanced structural monitoring provides structure owners with timely, objective, and precise information regarding the actual condition of their bridges and other major structures. These approaches provide for more precise condition assessment and risk profile; facilitate a wider range of capital expenditure options during bridge management; improve information on structurally deficient bridges, thereby extending the bridge's operational life; improve transparency in decision making; and reduce unnecessary load postings, detours, and added costs.

Driverless and Automated Train Technology
David Thurston, Parsons
This presentation described the efficiency and sustainability enhancements of rail and mass transit systems such as automated train control.

Innovative Approaches:

Extending Bridge Life Using Advanced Technology and Sustainable Practices
Dyab Khazem, Parsons
Parsons has employed approaches to assess and extend bridge life through the fusion of two key phases: (1) application of advanced technology and (2) implementation of sustainable practices. In the advanced technology phase, inspection, field monitoring, and finite element modeling are employed to develop a more complete understanding for the present deteriorated state of the infrastructure and to identify the mechanisms perpetuating deterioration. Sustainable practices are then identified and developed to extend the life of the bridge. These practices span the full range of engineering and include improved material selection, advanced in situ material and element treatment, strengthening of deteriorated elements, and selective replacement of expended elements. Parsons is continually expanding these advanced technology and sustainable practices through collaboration with top universities, leading technology firms, and proactive infrastructure owners to facilitate sustainable maintenance and operation of the built infrastructure.

Bridges on the Move
Loet Schartman, MammoetUSA South Inc.
Bridge construction and replacement often leads to long delays over an extended period due to lane closures. These circumstances contribute to extra fuel consumption, extra air pollution, and a negative impact to the public. Mammoet's innovative construction equipment offers improved construction approaches. Using Mammoet's construction equipment, bridges or bridge sections can be constructed away from traffic and during a nightly closure over the weekend; the old bridge can be lifted off its bearings and transported away; and the new bridge can be transported from its construction site and installed in its final location.

The use of SPMT's for Accelerated Bridge Construction
Fred Doehring, Utah Department of Transportation
Accelerated Bridge Construction (ABC) encompasses a wide range of technologies. This presentation will focus on bridge superstructure installation with self-propelled modular transporters (SPMTs). UDOT has installed 19 bridge spans using SPMTs and four more installations are tentatively planned for the 2011 construction season. In this construction approach, which is classically employed for replacing highway overpasses, the overpass bridge superstructure

is built offsite, removing need for highway lane closures and ensuring that the superstructure can be constructed in a controlled environment, thereby facilitating increased quality, safety, and productivity. SPMTs are then used to move the new superstructure into place in one night or less. Traffic is then permitted to flow under the bridge uninterrupted and the overpass is opened to traffic within as little as 10 days. This approach decreases delays and disruptions while increasing safety, quality, construction speed, and overall productivity.

Integrating Sustainability in Mega Projects Sustainability

A Metro Rehabilitation Perspective

Tony Gowland, Parsons

The Train Systems Optimization process enables transit authorities to optimize the systems performance and whole life cost. It demonstrates how rehabilitation can sustainably increase capacity while reducing energy consumption and lower capital expenditure and operational costs. The process has been employed by London Underground to inform their future investment strategy for the rehabilitation of the tube network. Validation of the process, new technologies, systems performance, and cost benefit analyses have been undertaken with industry through detailed design studies. The Train Systems Optimization methodology enables transit authorities to make better investment decisions and demonstrate improved alignment with corporate objectives.

Sustainability Features of the East Side Access Project

Mark McClintock, Parsons

The East Side Access (ESA) project is a $6.9 billion extension of the Long Island Railroad (LIRR) into Grand Central Terminal (GCT). The project includes a rail yard, support facilities, 4 miles of tunnel, and a major new 350,000-ft2 passenger terminal at GCT. This presentation will discuss the steps taken in the design of this facility to reduce energy consumption and incorporate sustainable concepts. It will also discuss some options that were considered but could not be included either because of schedule, budget or technical constraints.

LAX Airport Retrofit

Russell Carlisle, Parsons

Abstract not available