

Parking Going Green

Reducing Parking's Carbon Footprint



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Kimley»Horn

***Parking Going Green** Reducing Parking's Carbon Footprint*

- What comes to mind when you think “**Green**”?



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- What comes to mind when you think "**Green Parking**"?



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- More “**Green Parking**” thoughts?



Santa Monica Civic Center Garage
Moore Ruble Yudell Architects & Planners

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- What does it mean to be “Green”?



- “Meeting the needs of the present without compromising the ability of future generations to meet their own needs”
- Green buildings minimize the environmental impact during construction and operation and have increased efficiency throughout their life cycle

Sustainability Quotes

- “Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has.”
 - **Margaret Mead**
- “A mind that is stretched by a new experience can never go back to its old dimensions.”
 - **Oliver Wendell Holmes**

Sustainability Quotes

- “The time is always right to do what is right.”
 - **Martin Luther King, Jr.**
- “It is not the answers that show us the way, but the questions.”
 - **Rainer Maria Rilke, Czech poet**
- “Every morning I awake torn between a desire to save the world and an inclination to savor it. This makes it hard to plan the day.”
 - **E.B. White**

Sustainability Quotes

- "There are no passengers on Spaceship Earth. We are all crew."
 - **Marshall McLuhan**
- "All things are possible once enough human beings realize that everything is at stake."
 - **Norman Cousins**
- "We shape our buildings, then our buildings shape us."
 - **Winston Churchill**

Sustainability Quotes

- "The future is literally in our hands to mold as we like. But we cannot wait until tomorrow. Tomorrow is now."
 - **Eleanor Roosevelt**
- "The earth and the human community are bound in a single journey."
 - **Thomas Berry**
- "To survive in the world we have transformed, we must learn to think in a new way. As never before, the future of each depends on the good of all."
 - **Nobel Statement, December 2001**

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- What is LEED®?
 - Leadership in Energy and Environmental Design
 - LEED® was developed by the U.S. Green Building Council (USGBC)
 - "The LEED® Green Building Rating System is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings."



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- What is LEED®?

- The LEED Green Building Rating System is a voluntary, consensus-based national rating system for developing high-performance, sustainable buildings. LEED addresses all building types and emphasizes state-of-the-art strategies in six areas:

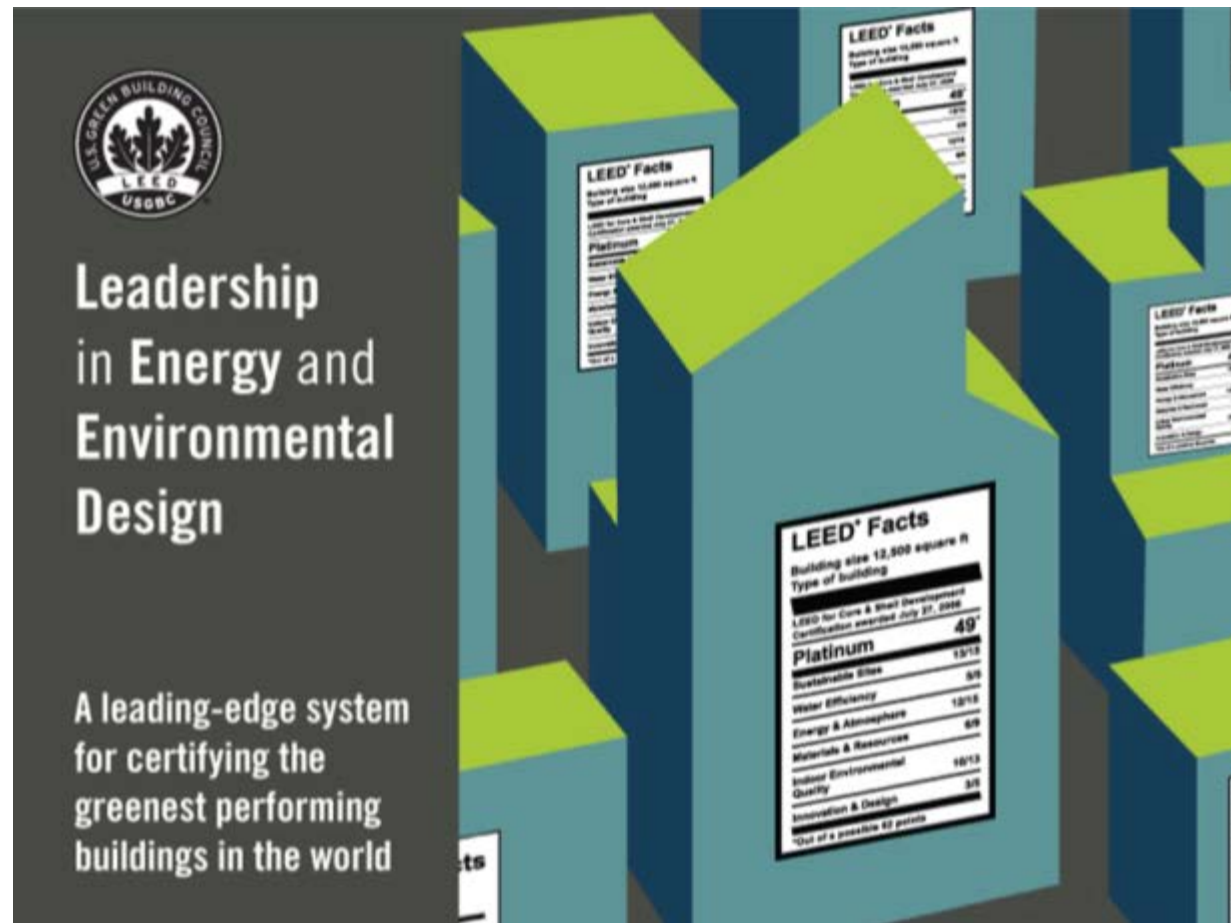
- Sustainable site development
 - Water savings
 - Energy efficiency
 - Materials and resources selection
 - Indoor environmental quality
 - Innovation & design process



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Leadership in Energy and Environmental Design

- The Leadership in Energy and Environmental Design program was developed to create standards for the Greenest performing buildings in the world.



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USGBC has four levels of LEED certification



**26-32 Points
Certified**

**33-38 Points
Silver**

**39-51 Points
Gold**

**52-69 Points
Platinum**

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Leadership in Energy and Environmental Design

- “Green Buildings” are assessed in 5 categories
 - Site Planning
 - Water Management
 - Energy
 - Material Use
 - Interior Environment Quality

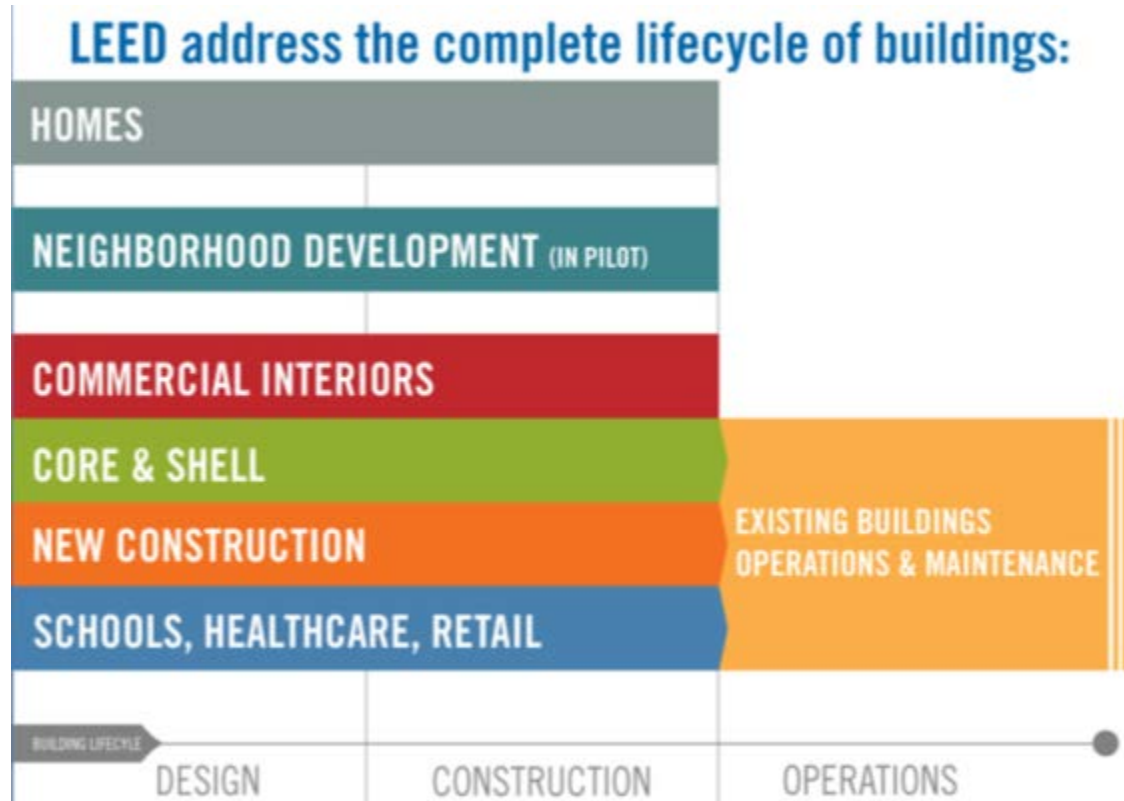
What Is Green Building?



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Leadership in Energy and Environmental Design

- LEED Certification addresses the complete lifecycle of buildings.
 - Design
 - Construction
 - Operations



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Leadership in Energy and Environmental Design – Cross Functional Teams

- LEED Certification is most successful when cross functional teams are developed and remain engaged throughout the process.

ENGINEERS OPERATIONS AND MAINTENANCE TEAMS
BUILDING OCCUPANTS BUILDING MANAGERS BU
FACULTY ENVIRONMENTAL HEALTH AND SAFETY STAFF
GROUNDSKEEPERS CAPITAL PLANNING STAFF GR
UTILITY MANAGERS INTERIOR DESIGNERS UTILITY MANA
CUSTODIAL TEAM PROPERTY MANAGERS CUSTOI
HUMAN RESOURCES BUILDING OWNERS HUMAN
PURCHASING STAFF ENVIRONMENTAL GROUPS
ENGINEERS OPERATIONS AND MAINTENANCE TEAMS
BUILDING OCCUPANTS BUILDING MANAGERS BU

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Leadership in Energy and Environmental Design

- Examples of LEED Certified Projects



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Leadership in Energy and Environmental Design

- Examples of LEED Certified Projects



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Leadership in Energy and Environmental Design

- Examples of LEED Certified Projects



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Leadership in Energy and Environmental Design

- Examples of LEED Certified Projects



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PERCEIVED ADVANTAGES OF BUILDING GREEN

8-9% decrease in operating costs

7.5% increase in building values

6.6% improvement in ROI

3.5% increase in occupancy

3% rent increase

Source: www.usgbc.org

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USGBC Tools

- Rating systems
- Reference guide
- Project checklist
- Credit Interpretation Requests (CIRs)
- LEED Online
- Educational workshops
- Project case studies
- www.usgbc.org



- Advantages of Building “Green”?
 - Reduced operating costs and LCC
 - Increase value of building
 - Tax incentives (credits and accel. depr.)
 - Utility rebates (reduced energy usage)
 - Enhanced marketability for lease or sale
 - Less pollution
 - Less waste and material usage
 - Less energy and water depletion

- Who is Building “Green”?
 - Early adopters have been institutions:
 - Higher education
 - Medical centers
 - Governments
 - All GSA buildings must be silver LEED® Certified
 - Non-profits
 - Private sector is seeing the benefits from the previous slide and are increasingly adopting green building principles
 - Some state and local governments are considering requiring sustainable new buildings



- Barriers to Building “Green”?
 - More time to research, design, document and attain LEED certification
 - Takes extra work to integrate planning, design, commissioning, and operations
 - May cost more for design and construction:
 - Many new “green” products
 - Competition and volume may drive costs down
 - Green construction may be 2-5% premium

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- Is “Green” Parking an Oxymoron?



Parking “Meterpops”



Parking “Meterpops”

- Can Parking Be Green?



- USGBC/LEED certifies occupied commercial buildings for sustainability
- LEED includes points for alternative transportation & public transportation and is not pro-automobile
- However, LEED does prefer density of parking structures over parking lots



- Can Parking Be Green?
 - Stand alone parking structures cannot obtain LEED certification at this time
 - Parking can provide LEED points
 - Mixed use parking structures can obtain LEED certification
 - Santa Monica Civic Center
 - Blue Cross Blue Shield

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- There are many opportunities to include LEED green features in parking design
 - Sustainable site development
 - Water savings
 - Energy efficiency
 - Materials and resources selection
 - Indoor environmental quality
 - Innovation & design process



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- Sustainable Site Development
 - Green Roofs over underground parking



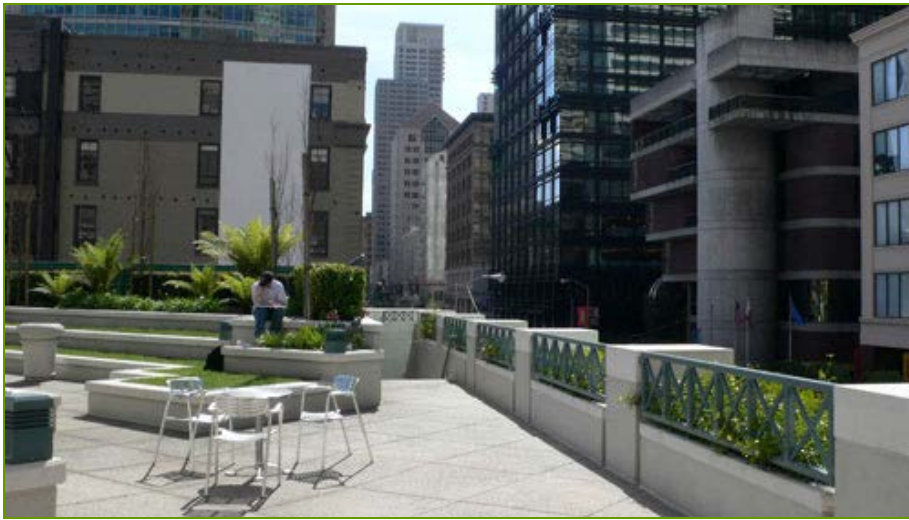
Museum of Science & Industry, Chicago IL



Millennium Park, Chicago IL

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- Sustainable Site Development
 - Green Roofs
 - Reduce heat island
 - Reduced and filtered storm water run off
 - Improved aesthetics
 - Provide outdoor space



Simple Roof Top Plaza



Extensive Roof Top Park

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- Sustainable Site Development
 - Green Roofs atop above ground parking



Blue Cross Blue Shield, Detroit MI
Neumann/Smith Architecture

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- Sustainable Site Development
 - Green Roofs



Athletic field atop parking



Solar panels atop parking \$1.5 million
Provide some or all of the energy needs 17
year pay back this was not a financially driven
feature

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- Sustainable Site Development
 - Parking Canopies



Canopies reduce heat island effect & provide sun and hail protection



Solar panels atop canopy

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- Sustainable Site Development
 - Minimal site disturbance – Max open space



***Parking Going Green** Reducing Parking's Carbon Footprint*

- Sustainable Site Development
 - Minimal site disturbance – Max open space



***Parking Going Green** Reducing Parking's Carbon Footprint*

- Sustainable Site Development
 - Alternative transportation



Bicycle Parking Structure



Bicycle Parking Lot

USGBC would prefer to see bicycle parking lots and structures rather than automobile parking facilities.

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- Sustainable Site Development
 - Alternative transportation – Bike parking, changing rooms and showers



Bike Storage Facility

In the USA, we're more likely to see smaller bike storage facilities at the present time



Bike Rental Programs



Another new concept gaining traction is "Bike Concierge Programs" such as "Bike Station"

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- Sustainable Site Development
 - Alternative transportation access, preferred hybrid and HOV parking & alternative fuel stations



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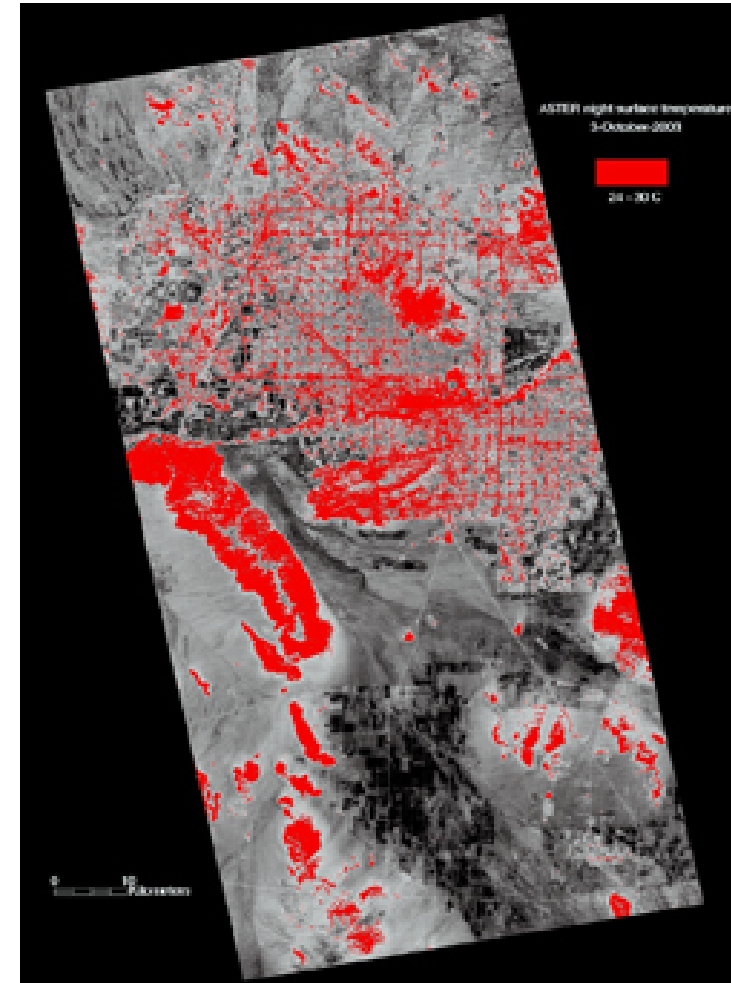
- Sustainable Site Development
 - Pervious concrete pavement



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“Cool Pavements”

- Cool pavements are designed to reduce adverse climatic impacts such as the Urban Heat Island by optimizing the physical thermal characteristics of pavement design.
- This includes single and multi-layer designs which optimize thermal conductivity, heat storage capacity, density and emissivity.



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“Cool Pavements”

- Surface Lot 9 at Arizona State University was converted from asphalt to “pervious concrete”.
- The new material features more openings and voids in its surface texture that allows water to flow more easily through it.

Paving the Way to Sustainability

Resurfacing a parking lot is usually done as a part of routine maintenance. However, routine hardly describes the new surface of Lot 9, the metered lot just west of the ASU Art Museum.

In a partnership with PTS, the National Center of Excellence on SMART Innovations for Urban Climate and Energy (NCE), converted the surface of Lot 9 from asphalt to pervious concrete. The new material, which features more openings and voids in its surface texture, allows water to flow more easily through it, leading to faster drainage and an increased ability to recharge groundwater aquifers.

“It looks like a Rice Krispie material in a way,” said Kamil Kaloush, co-director of the NCE.

Pervious concrete also sheds heat much faster than regular pavement, which helps reduce the urban heat island effect. The new concrete is anticipated to decrease maintenance costs of the lot.

The “New American Parking Lot” project has drawn a great deal of interest throughout the region. Pervious concrete has been used in more humid climates for several years, but Lot 9 is the first significant parking project to utilize the material in Arizona. The NCE was looking for an area to test some designs and contacted PTS about paving with the eco-friendly pavement at the Tempe campus. Lot 9 now serves as an example for local governments and agencies interested in using this technology.

ASU is among the leaders in applying sustainability to everyday life, and PTS is proud to be a part of that effort of environmental stewardship.



Pervious concrete allows for much faster water drainage. Above, the portion of ordinary concrete in Lot 9 is more wet than the pervious concrete in the foreground.



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“Cool Pavements”

- **The paving material is recognized by the U.S. Environmental Protection Agency** for its benefits for water-pollution control, storm water management, safety, and in reducing the negative impact of urban heat islands and for allowing trees and other plant life to flourish even in areas of intensive land development.
- **Pervious concrete also is recognized by the U.S. Green Building Council's Leadership in Energy and Environmental Design** program for enabling integration of paving and drainage that allows for a smaller development footprint on land sites by reducing the amount of land needed to manage storm water.
 - **Pollution control:** It eliminates water pollution through natural biological processes. As water infiltrates the soil beneath the pavement, larger pollutants are filtered out and/or microorganisms break down pollutants until they are inert.
 - **Recharging ground water aquifers:** Instead of diverting water to a storm water drainage system, infiltrating water will eventually reach aquifers to help replenish them.
 - **Urban climate control:** By absorbing and storing less heat, it reduces the heat buildup and heat radiation produced by conventional asphalt and concrete pavements.
 - **Improving tree health:** By improving the access of air and water to root systems, trees that surround pervious concrete parking lots have been shown to live long and grow wider than trees in areas with impervious pavements.
 - **Safety:** By preventing standing water from pooling on paved surfaces it reduces the potential for vehicles hydroplaning and causing drivers to lose control.

“Water Retaining Parking Lots”

New Greensburg, PA

“Parking Lots Are Earth-Friendly”

- New parking lots in New Greensburg, PA have buried chambers to hold rain water and release it into the ground slowly.
- This design prevents pollutants from being washed directly into the storm drain system.



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- Sustainable Site Development
 - Traffic grid and grass for temporary parking



***Parking Going Green** Reducing Parking's Carbon Footprint*

- Sustainable Site Development
 - Natural drainage landscapes



Storm Drainage Bio-swale



Storm Drainage Garden/Retention

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- Sustainable Site Development
 - Capture and reuse waste water when pressure washing
 - Sand/oil separator
 - Storm water retention or detention



Power Washing & Water Recapturing



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- Water savings
 - Water efficient landscaping
 - Water landscaping with non-potable water – i.e. using retained storm water
 - Innovative waste water technologies
 - Water use reduction of 20%-30%



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- Energy Efficiency
 - Optimize energy performance
 - Fluorescent lighting – 45% savings compared to MH & HPS
 - Induction lighting
 - LED lighting
 - Lighting control systems
 - Renewable energy 5% - 20%
 - Photovoltaic solar panels
 - Solar powered lights



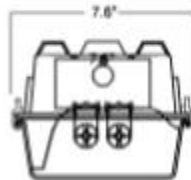
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- Energy Efficiency in Parking Lighting

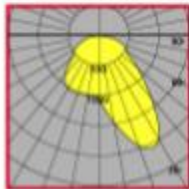
High-Intensity Fluorescent Garage Luminaire HID Replacement



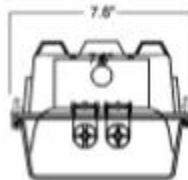
CLS - PHOTOMETRY:



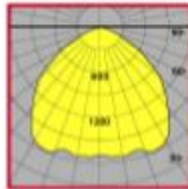
2 Lamp Asymmetric



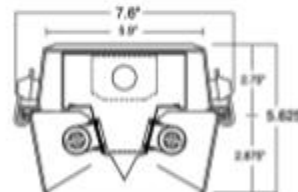
Fixture Efficiency: 85.7
SC Across: 0.7, SC Along: 1.2



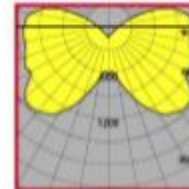
2 Lamp Normal



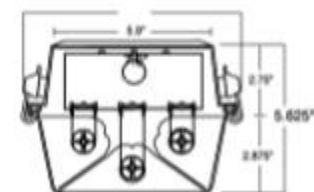
Fixture Efficiency: 80.2%
SC Across: 1.4, SC Along: 1.3



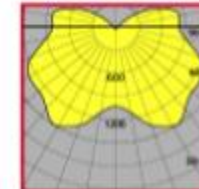
2 Lamp Broad



Fixture Efficiency: 79.1%
SC Across: 2.9, SC Along: 1.3



3 Lamp Broad



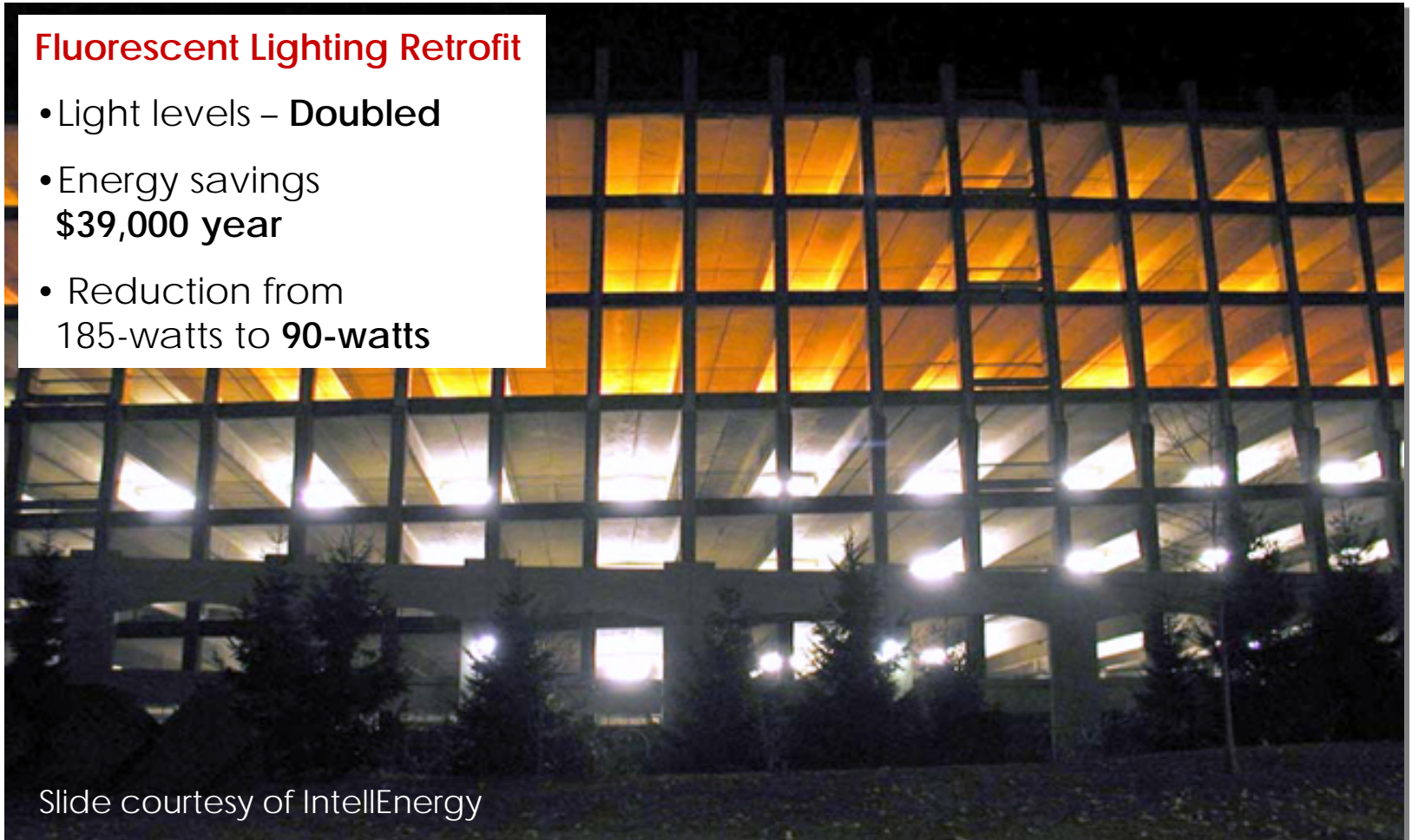
Fixture Efficiency: 76.2%
SC Across: 1.9, SC Along: 1.3

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- Energy Efficiency in Parking Lighting

Fluorescent Lighting Retrofit

- Light levels – **Doubled**
- Energy savings
\$39,000 year
- Reduction from
185-watts to **90-watts**



Slide courtesy of IntellEnergy

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- Energy Efficiency in parking lighting



Before

Light levels – tripled

Energy savings - \$27,000/year

Reduction from 210 watts to 98 watts



After

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- Energy Efficiency in lighting controls
 - One energy saving strategy is to install dimmers on all HID and fluorescent lights and then dim them during off-peak and after hours, but immediately ramp them up to full power in response to motion or occupancy sensors.



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Lighting Control Dimmer Example:

- Electricity cost = \$0.10/kW-hr
 - Lighting power = 100,000 Watts at full power (876,000 kW-hr/year)
 - Dimming to 90% for 50% of the time = 394,000 kW-hr/year
 - Dimming to 50% for 50% of the time = 219,000 kW-hr/year
- Total = 613,000 kW-hr/year

This dimming scheme saves 263,000 kW-hr/year (30%)

Cost savings = \$ 26,300/year

Payback = 14 months for HID (11 months for fluorescent lamps)

Outdoor parking lots also save by dimming to 50% when unoccupied.

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- Energy Efficiency – Renewable Energy



Solar Panels as Parking Space Canopies

***Parking Going Green** Reducing Parking's Carbon Footprint*

- Energy Efficiency – Renewable Energy



Solar Panels as Parking Space Canopies



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- Energy Efficiency – Renewable Energy



Solar Powered Light Fixtures

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- Energy Efficiency – Renewable Energy



Santa Monica Civic Center Parking Solar panels at roof top canopies and on façade panels



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- Materials and Resources Selection

- Reuse existing facades or shell
- Construction waste management – recycle & reuse
- Recycled steel
 - Structural steel
 - Concrete rebar
 - Handrails, grilles, bollards, etc.
- Carbon fiber reinforcement
- Thin brick façade panels
- Recycled rubber
- Green concrete



- Green Concrete Materials and Resources
 - Use Supplementary Cementitious Materials (SCM)
 - Recycled flyash, slag and microsilica
 - SCM key to high performance concrete
 - More workable during placement and finishing
 - Stronger concrete
 - Less permeable concrete
 - Resist alkali-silica reaction (ASR)
 - Extended service life
 - Cement replacement
 - Cement manufacturing creates 5% of CO₂ emissions
 - 1 ton of SCM reduces CO₂ emissions by 1 ton

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- Green Concrete Materials and Resources
 - Recycled aggregate – footings and walls
 - Local/regional materials
 - Aggregate
 - Cement
 - Precast production
 - Reuse formwork
- Use green food coloring



- Indoor Environmental Quality

- CO₂ Monitoring
- Maximize natural ventilation
- Promote natural lighting
- Use low VOC products
 - Paint
 - Silane Sealer
 - Deck coating
- Use sustainable cleaning supplies



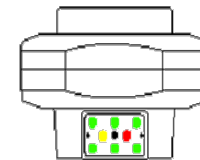
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- Innovation & Design Process

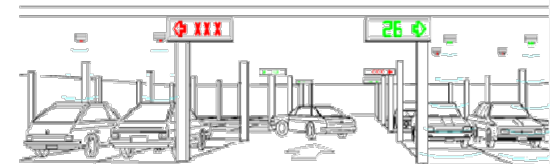
- Parking guiding systems
- Automated parking
- Green roofs
- Green facades
- Solar power
- Design for 75-100 year life



Parking Guidance System



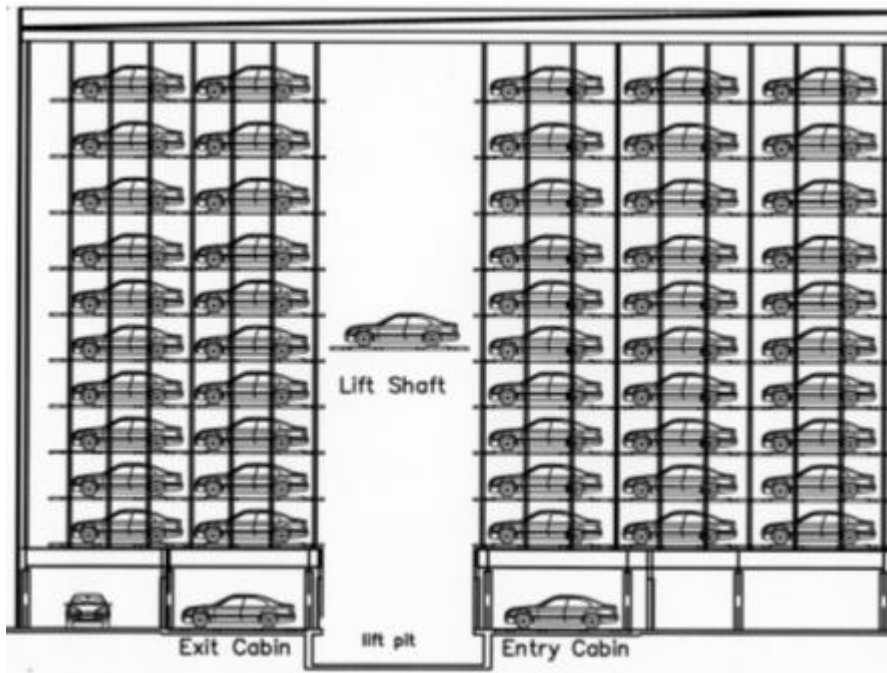
PARKING



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- Automated Parking

- Reduced emissions
- Reduced lighting
- Maximize open space



***Parking Going Green** Reducing Parking's Carbon Footprint*

- Green Roofs



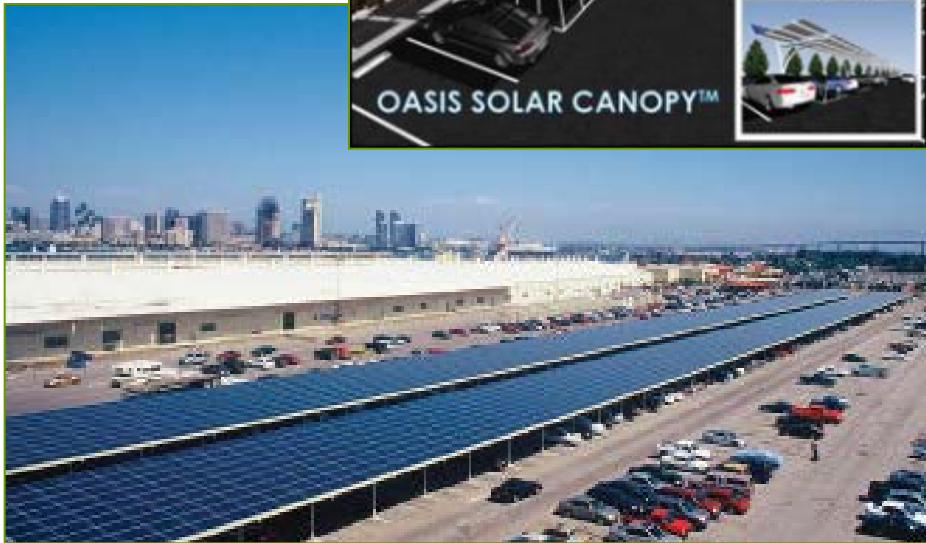
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- Green Facades



***Parking Going Green** Reducing Parking's Carbon Footprint*

- Solar Power



Solar Grove(TM); an array of 25 "solar trees"(TM) that converts a 186-vehicle parking lot into a 235-kilowatt solar electric generating system in San Diego.

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- Solar Power



Pennington Street Garage

Tucson, Arizona

Photo: Kyocera Solar, Inc.

Kyocera Solar, Inc.
800-223-9580 toll-free
800-523-2329 fax
www.kyocerasolar.com

System Specifications

System Size

60.1 kW STC

Estimated Yearly Power Production

110,000 kWh

System Configuration

Utility Interaction - Grid Connected

Solar Modules – 360 KC167G

Inverters – 10 SMA Sunny Boy 6000U

Batteries - None

Charge Controllers - None

Mount Structure

Custom designed steel carport shade canopy

Unique Feature

This system offsets the purchase of utility power during daytime hours for the City of Tucson. The uniquely integrated PV array acts not only as a power generator, but also as a shade structure for an entire row of parking spaces on the top floor of a seven story garage.

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- Extended Service Life – 75 to 100 years
 - Avoid future landfill contribution
 - Delay material usage in future
 - Prepare preventative maintenance program & schedule

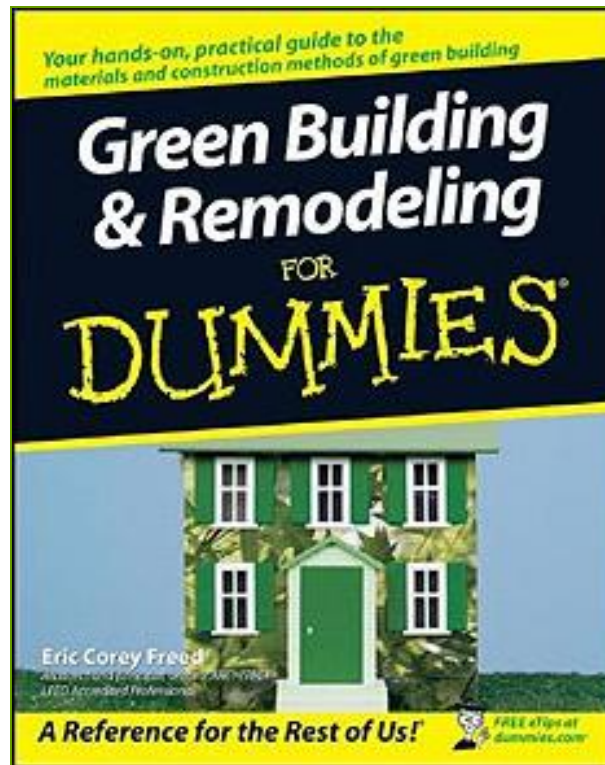


- Owner's Program Must Define Green Objectives
 - 75 year life
 - Mixed use space
 - Utility costs \leq 50% of metal halide
 - Bike parking
 - 5% hybrid, alternative fuel, and HOV parking spaces

- Owner's Program Must Define Green Objectives
 - Desired innovative sustainable features
 - Green roof
 - Solar panel canopies
 - Extent of recycled, reclaimed and regional materials
 - Construction cost budget & premium for green
 - Some studies report a 2% - 5% cost premium
 - Life cycle costs could be less
 - LEED certification rating goal - Silver

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- And as in many areas of life, where can you go for help regarding your green questions?



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Sustainable Parking & Transportation Management



Examples of Successful Green Program Elements

Commute Options

You've Got Options

Sustainable Parking & Transportation Management

- ***Carl Walker, Inc.*** has submitted a proposal to the USGBC recommending a defined program that would specifically assess a variety of parking and transportation demand management elements for inclusion in the LEEDs certification.
- The proposal is currently being considered.



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Innovative Car Pool Programs

Calgary Parking Authority

- Waitlist Management –
- Alignment with Community Goals – Trip Reduction Goals
- 1/2 available parking inventory directed to car pool interested customers
- Innovation - "Car Pool Waiting List" - "Jump the Queue"
 - 2 - 8 years
- Video monitoring for compliance tied to access card numbers



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Innovative Car Pool Programs



- Provide a variety of web-based resources.
- Links to other information sources and agencies.

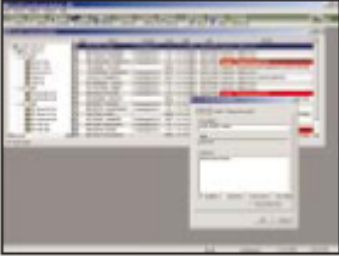


“Shared Account” Car Pool Programs

- Issue access cards to a group of contract parkers
- Set an occupancy limit
- When the group reaches their limit, all other cards in the group are automatically locked out.
- The “Shared Accounts Plus” software can apply different rate structures to each group and set multiple thresholds.
- It can also be used to manage lease contracts, carpools and other multi-card accounts.

Shared Accounts/Car Pool

Here's an innovative way to manage valuable space in your parking facility. Issue access cards to a group of contract parkers and set an occupancy limit. When the group reaches their limit, all other cards in the group are automatically locked out. When occupancy drops below the threshold the system lets additional cardholders in again. The system supports carpools, individuals with multiple cards, or group accounts with specific occupancy limits.




Generate even more revenue using our advanced Shared Accounts Plus. It automatically calculates a fee for exceeding programmable occupancy limits, and charges it to the account. You can apply different rate structures to each group account and set multiple thresholds.

Use Shared Accounts to manage lease contracts, carpools, and other multi-card accounts. With either module, it's a new profit center made easy with no required monitoring.

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Program Tools


- Educating drivers on the hidden costs of vehicle ownership.
- Gas
- Maintenance
- Insurance
- Parking
- Registration
- Taxes
- Annualizing costs makes an impact.



Canadian Automobile Association

2005 Edition

Driving Costs



Operating Costs (variable)	Average per Km	
	Cavalier Z-24	Coravan
Fuel*	8.58¢	10.25¢
Maintenance	2.48¢	2.87¢
Tires	1.79¢	1.88¢
TOTAL	12.85¢	14.99¢

* Gasoline costs are based on the national average gas price (as of December 2004) of \$0.94 per litre. The fuel costs reflect the purchase of no-lead, regular-grade gasoline, based on 100% self-service gasoline prices.

Ownership Costs (fixed)	Cost per Year	
	Cavalier Z-24	Coravan
Insurance**	\$1,777.00	\$1,652.00
License and Registration	\$117.00	\$119.00
Depreciation**	\$4,250.00	\$4,830.00
Finance Expense (Car Loan)***	\$800.00	\$996.00
ANNUAL TOTAL	\$6,954.00	\$7,597.00
AMOUNT PER DAY	\$19.07	\$20.82

** Insurance Costs are based on a "commuter" category or typical sample of insurance coverage—vehicle driven less than 10 kilometres per day, to and from work, with no young drivers.
 • \$250 Deductible Comprehensive
 • \$500 Deductible Collision
 • \$1,000,000 Inclusive Third Party Liability (total insurance cost).
 Please consult with your insurance professional for other options.

** For kilometrage in excess of 18,000 kilometres annually, an additional depreciation allowance of \$130.00 for the Cavalier Z-24 and \$180.00 for the Coravan per thousand should be added to the fixed costs.
 The depreciation factors of \$4,250.00 for the Cavalier Z-24 and \$4,830.00 for the Coravan are average annual figures predicted on car trade-in values of these vehicles at the end of four years with 72,000 kilometres on the odometer.

*** Based on 6.50 interest; 10% down payment, four-year loan.

ANNUAL DRIVING COSTS

The amount of driving has a direct relationship to the cost per kilometre of driving. Using the Rumsheimer figures in the preceding table, you can expect the following approximate costs, based on the number of kilometres driven:

Kilometres Driven per Year	Annual Operating Costs (variable)	Annual Ownership Costs (fixed)	Total Cost	Cost per Kilometre
12,000 km	\$1,542.00	\$6,960.00	\$8,502.00	70.8¢
16,000 km	\$2,056.00	\$6,960.00	\$9,016.00	56.40
18,000 km	\$2,514.00	\$6,960.00	\$9,474.00	52.6¢
24,000 km	\$3,084.00	\$7,780.00	\$10,864.00	45.28
32,000 km	\$4,112.00	\$8,092.00	\$12,204.00	40.64

Kilometres Driven per Year	Annual Operating Costs (variable)	Annual Ownership Costs (fixed)	Total Cost	Cost per Kilometre
12,000 km	\$1,752.00	\$7,580.00	\$9,332.00	77.8¢
16,000 km	\$2,536.00	\$7,580.00	\$10,116.00	63.24
18,000 km	\$2,628.00	\$7,580.00	\$10,208.00	56.70
24,000 km	\$3,264.00	\$8,707.00	\$11,971.00	49.88
32,000 km	\$4,672.00	\$9,252.00	\$13,924.00	43.54

HOW TO CALCULATE YOUR OWN VEHICLE EXPENSES

Operating Costs

Gas: To determine gas costs, start with a full tank of gas, record the odometer reading, and drive until the tank is almost empty. (It is important to conduct the test under driving conditions you normally encounter.) Then fill up once again. Divide the number of kilometres driven since the start of the test, by the number of litres required to fill the tank. The result... the number of kilometres per litre your car is getting. Repeat the test for greater accuracy.

Maintenance: Proper maintenance affects the life of your vehicle, your fuel economy and your safety. Neglecting repairs and maintenance will show up eventually as increased depreciation. The best way to determine your maintenance costs is to keep a record of expenses. If you haven't kept a record, then estimate costs at an average of 2.48 cents per kilometre driven—an average developed for a standard sedan (Cavalier Z-24) with only routine maintenance and 2.87 cents for a standard minivan (Coravan).

Tires: How and where you drive has a significant effect on tire costs. High speeds, low tire inflation, hard cornering, rapid acceleration and quick stops all contribute to fast tire

Environmentally Sensitive Facility Pressure Washing



- Affordable on-site treatment of the wastewater generated to remove contaminants, such as oil, grease, hydraulic fluids, trace metals, PCBs or paints.

Budget:

\$0.05 – \$0.12 per square ft.

- The basic components of the “environmentally sensitive pressure washing systems”:

Pressure washer or water jetting equipment

- Heater (optional)
- Vacuum/Recovery System
- Waste Water Processor

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Fluorescent Lamp Recycling

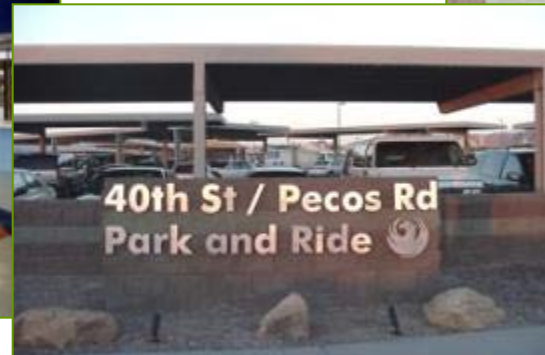
- Spent Fluorescent Lamps Must be Properly Handled and Stored to Limit Mercury Exposure.
- Energy efficient fluorescent lamps can contribute to a cleaner environment, but they must be managed properly. For most us, fluorescent lamps present the single greatest risk of mercury exposure in the work place. Protect the health and safety of your employees and customers
- Reduce the soft costs of managing mercury waste
- Reduce your company's risk and liability
- Improve your regulatory compliance



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Integrating Multi-modal Options into Parking Facilities

- Installing bike lockers is just one example of incorporating multi-modal options into parking structures and contributing to a more balanced parking and transportation program.
 - Other more aggressive strategies include integrating bus or shuttle transfer stations into parking garages.
 - Creation of express park and ride lots, etc.



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Lighten Up!

- Painting or staining the interior of parking structures is one of the best ways to improve the perception of customer safety and facility cleanliness.
- Painting the underside of parking levels as well as vertical elements such as wall and columns **increases lighting levels through improved reflectivity (approximately 15%) without increasing energy consumption.**

Except from **Carl Walker** Paint/Stain Specification:

- Provide paint system consisting of two coats of a (white) water-base penetrating stain in accordance with Manufacturers recommendations.
- Approved stain systems are as follows:
 - Canyon Tone Stain "W", United Coatings
 - W-1, Okon Inc.
 - Aquastain, Tamms Industries Co.
 - H & C Concrete Stain AC1W, Glidden
 - Or Approved Equivalent



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Xeriscape

- Xeriscaping is the practice of water conservation through creative landscaping.

Benefits of Xeriscaping:

- Low water consumption
- Low maintenance
- Protects water quality
- Increases health and beauty of surroundings
- Decreases pest control needs



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Marketing Transportation Options



OPTIONS: WIN
CLICK HERE

You've got options!

It's your choice ...

... about the way you commute to campus. We'd like to offer you a few other options - carpooling, biking, walking, busing, vanpooling. Cal Poly OPTIONS is here to help.

• Commute Options • Resources • Testimonials • F. A. Q.'s & Maps



Hotline: 756-2323



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Marketing Transportation Options

- Marketing and promotions are often under-estimated in terms of their potential to promote modal shifts and therefore environmental impacts.



Commute
Options

commute@calpoly.edu

• Hotline: 756-2323

• Commute Options • Resources • Testimonials • F. A. Q.'s & Maps

What are your OPTIONS?

It's your choice about the way you commute to campus. We'd like to offer you a few other options - carpooling, biking, walking, busing, vanpooling. Cal Poly OPTIONS is here to help.



Biking :: Sneak some playtime into your day!

You remember how fun this was when you were a kid? It's still the same rush now that we're grown up and going to campus for work and class. Biking is a joyride for your mind and body—the perfect infusion of fun, healthy energy to get you where you need to be. Tune up your body and your budget every day.

link :: <http://www.slobikelane.org/>



Walking :: Get your feet on the street!

Walking is the easiest OPTION to get you to school with a smile on your face. Each step saves you gas money and a lot of stress. SLO shows its real beauty when you see it close-up. Say goodbye to the woes of traffic and searching for parking. Say hello to your new favorite time of day.



Carpooling :: Beat the Drive-Alone Blues!

Those extra seats in your car are just begging to be used. Your car and wallet will thank you because you will be cutting down on fuel, maintenance and repair bills by leaving your car at home occasionally. So, sit back and chat with your new carpool buddies. Have some coffee. Do a crossword. Relax and enjoy the ride.

<http://alternetrides.com/index.asp?Destination=1122124857>



Vanpooling :: Everyone in the pool!

For those of us commuting from outlying communities, this is a perfect OPTION for making that precious time more precious. At a small cost, you can enjoy the leisure of new free time while someone else gets you to campus on time. No more daily wear-and-tear on your car. Now you can read the paper before your lunch break or grab a few extra minutes of rest.



Bus :: Let someone else do the driving!

Affordable. Convenient. Less stressful. Sound good? Get on the bus and rest your mind. OPTIONS can provide maps and schedules and even help you plan your best route. No worries—just time and space to enjoy your journey.

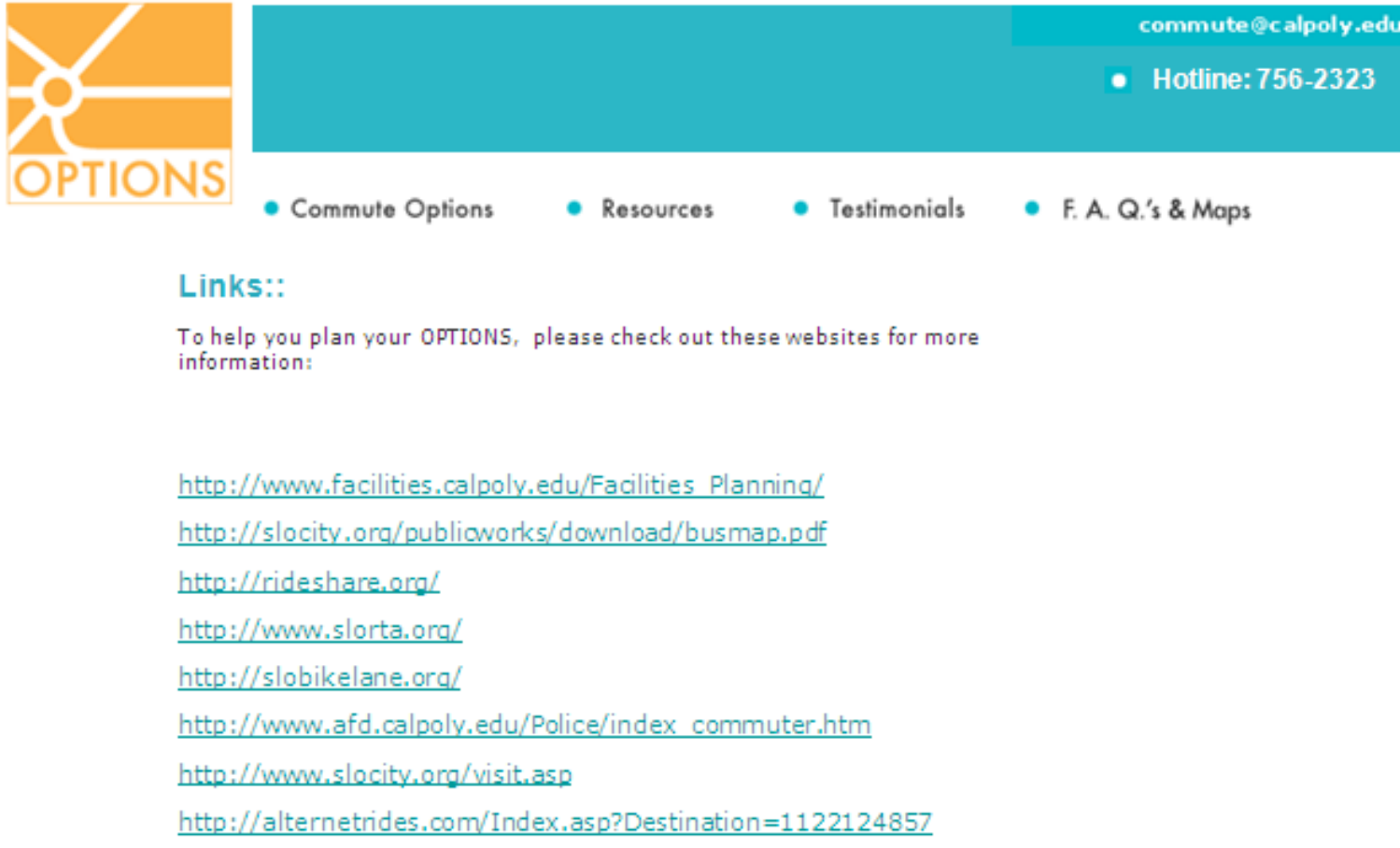
links :: <http://www.slorta.org/ccat.htm>
<http://www.slocity.org/visit.asp>

The choice is yours...

Kimley»Horn

Marketing Transportation Options

- Provide links to related programs and information sites.



The screenshot shows the homepage of the 'OPTIONS' website. At the top left is an orange logo with a stylized sunburst and the word 'OPTIONS' below it. To the right is a teal header bar containing the email 'commute@calpoly.edu' and a 'Hotline: 756-2323'. Below the header is a navigation menu with four items: 'Commute Options', 'Resources', 'Testimonials', and 'F. A. Q.'s & Maps'. The main content area is titled 'Links::' and contains a paragraph: 'To help you plan your OPTIONS, please check out these websites for more information:'. Below this are eight hyperlinks listed vertically.

Options

commute@calpoly.edu
Hotline: 756-2323

- Commute Options
- Resources
- Testimonials
- F. A. Q.'s & Maps

Links::

To help you plan your OPTIONS, please check out these websites for more information:

- http://www.facilities.calpoly.edu/Facilities_Planning/
- <http://slocity.org/publicworks/download/busmap.pdf>
- <http://rideshare.org/>
- <http://www.slorta.org/>
- <http://slobikelane.org/>
- http://www.afd.calpoly.edu/Police/index_commuter.htm
- <http://www.slocity.org/visit.asp>
- <http://alternetrides.com/Index.asp?Destination=1122124857>

Parking Going Green Reducing Parking's Carbon Footprint

Marketing Transportation Options

- Communicate upcoming changes.
- Especially regarding master plans and operational changes.



More changes ahead!

Parking availability has changed on campus and more changes are on the way. OPTIONS is here to help you by providing complete information about those changes and why they're happening.

What changes can we expect?

In Fall, 2004, 75 parking spaces were re-designated due to the expansion of California Boulevard to link with Highland Drive. In Winter, 2005, the H-2 parking lot will be closed when construction begins on the new Engineering IV building; however, a new lot will be constructed on Mt. Bishop Drive. (Please see attached map for more information.)

Additionally, fees charged to park on campus have been changed.

Those changes are listed below:

Daily Permit: \$4/day
Vendor Permit: \$4/day
Weekly Permit: \$12/week
Event Permit: \$5/day
Motorcycle Permit: \$20/quarter
Residential (annual): \$270/AY
General (quarterly): \$75/quarter
General (annual): \$225/AY

Why are these changes happening?

Cal Poly's Master Plan focuses on "user friendly" pedestrian access and increasing vehicle efficiency while decreasing the parking ratio. The Master Plan encourages students, faculty and staff to consider using different transportation options – such as biking, walking, carpooling, vanpooling and busing.

What is the Master Plan?

Cal Poly's Master Plan is the culmination of a four-year planning process that began with academic strategic planning in the 1997-98 academic year. Campus and community task forces worked to identify issues during 1998-99. The public was asked to comment on the Preliminary Draft in the Spring of 2000 and the Draft Environmental Impact Report in Fall 2000. The final Master Plan was accepted in 2001.

Clean Air Car Discounts

University of North Carolina – Greensboro

- UNCG offers a \$5 rebate offered to patrons who drive a “Clean Air Car”.
- Permit holders are eligible if their vehicle is recognized by the American Council for Energy Efficient Economy (ACCEE) with a green score of 40 or higher.
 - This includes many different fuel efficient vehicles.
- The rebate is put on the student ID for use on campus.
 - “We didn't want the cost to “cut” a check to be more than the rebate.”
- One reason was to help promote environmental awareness and sustainability.
- The program will allow the University to qualify for credit toward Leadership in Energy and Environmental Design (LEED) certification on for all new construction or renovations.
 - The only other way to get that point was to provide something like 15% of all parking spaces around each building attempting to get LEED certification for hybrid vehicles. That seemed to be a less efficient use of scarce resources.

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Free or Reduced Rate Parking for Hybrid Vehicles

Some municipalities are offering free metered parking to residents whose vehicles get 50 miles per gallon, have low emissions or are powered by an alternative fuel. Utah already offers an income tax credit of up to \$3,000 for residents who buy clean fuel vehicles and some electric hybrids.

- Salt Lake City joins New Haven, CT; Fresno, CA, Manitou Springs, CO and Albuquerque, NM, in the free parking meter program. In the last year, Austin, Texas, also approved a green vehicle incentive that provides \$100 in free parking.
- Commuters in Baltimore who use low-emissions vehicles can also buy parking passes at city-owned garages at a discounted rate.



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“Green” Parking Permits

- **Green Permits** cost two-thirds the price of the regular permit for both commuter students and campus residents. Students who own a car that gets 37 or more miles to the gallon will have the option of purchasing a green parking permit.
- Although the price of permits is going up 4 percent for the 2008-2009 school year, the increase is not related to the discount given for the green permit.
- A commuter permit will cost \$213, making the green permit about \$142 for commuters, while a resident permit will be \$412 or about \$275 with the same discount applied. The initiative, which is paired with DOTS' emphasis on carpooling, is meant to push commuter students toward being more environmentally sustainable.



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“Green” Parking Meters

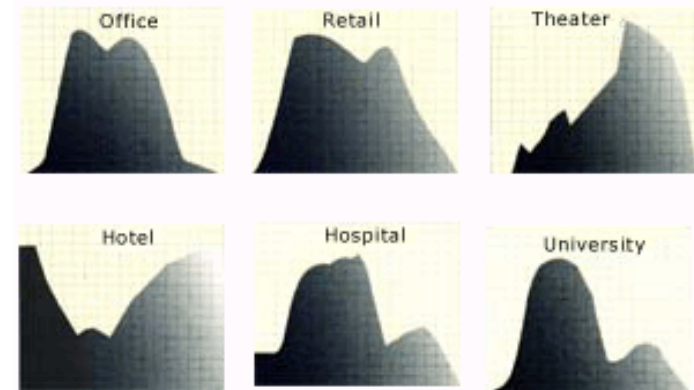
- In Billings Montana, the certain meters are designated as “Green”.
- The revenues from these meters are dedicated to street beautification through the Downtown Billings Association.



Shared Parking

- Shared parking can have a significant impact on mixed-use development parking requirements. Combining land uses results in a demand for parking spaces that is less than the demand generated by separate, freestanding developments of similar size and character.
- Shared parking is defined as parking space that can be used to serve two or more individual land uses, without conflict or encroachment
- The opportunity to implement shared parking is the result of two conditions:
 - Variations in the peak accumulation of parked vehicles as a result of different activity patterns of adjacent or nearby land uses (by hour, by day, by season).
 - Relationships among land use activities that result in people's attraction to two or more land uses on a single auto trip to a given area or development.

Usage Patterns



Flexible Zoning Regulations

More accurate and flexible standards means that the parking requirements at a particular location are adjusted to account for various factors.

Examples of Adjustment Factors:

- Geographic location
- Residential density
- Employment density
- Land-use mix
- Transit accessibility
- Car-sharing
- Walkability
- Climate



Parking Maximums

Parking Maximums means that an upper limit is placed on parking supply, either at individual sites or in an area.

Area-wide limits are called Parking Caps. These can be in addition to or instead of minimum parking requirements. Maximums often apply only to certain types of parking, such as long-term, single-use, free, or surface parking, depending on planning objectives.



Unbundling Parking

Unbundling means that parking is rented or sold separately, rather than automatically included with building space.

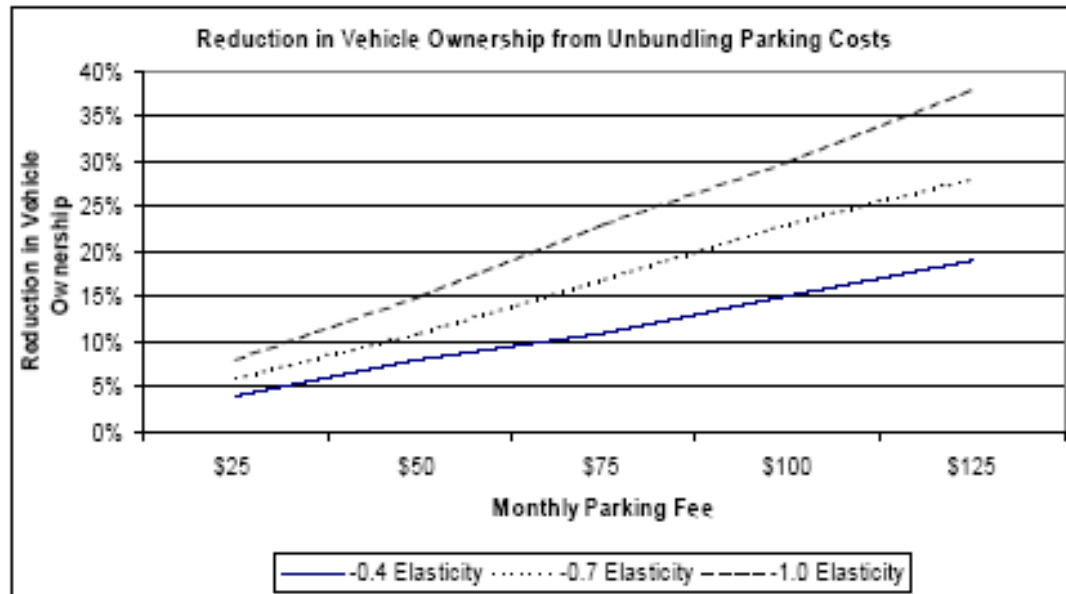
For example, rather than renting an apartment with two parking spaces for \$1,000 per month, the apartment would rent for \$800 per month, plus \$100 per month for each parking space. This is more equitable and efficient, since occupants only pay for parking they need.

- Facility managers can “unbundle” parking when renting building space.
- Developers can make some or all parking optional when selling buildings.
- In some cases it may be easier to offer a discount to renters who use fewer than average parking spaces, rather than charging an additional fee.

Vehicle Ownership Patterns

- Policies such as “unbundling parking” can directly influence vehicle ownership and parking demand.

Figure 2-12 Reduced vehicle ownership with unbundled residential parking



Parking Going Green Reducing Parking's Carbon Footprint

“Eco-Pass” – Free or Subsidized Transit Passes

- Impacting Transportation Mode Split.

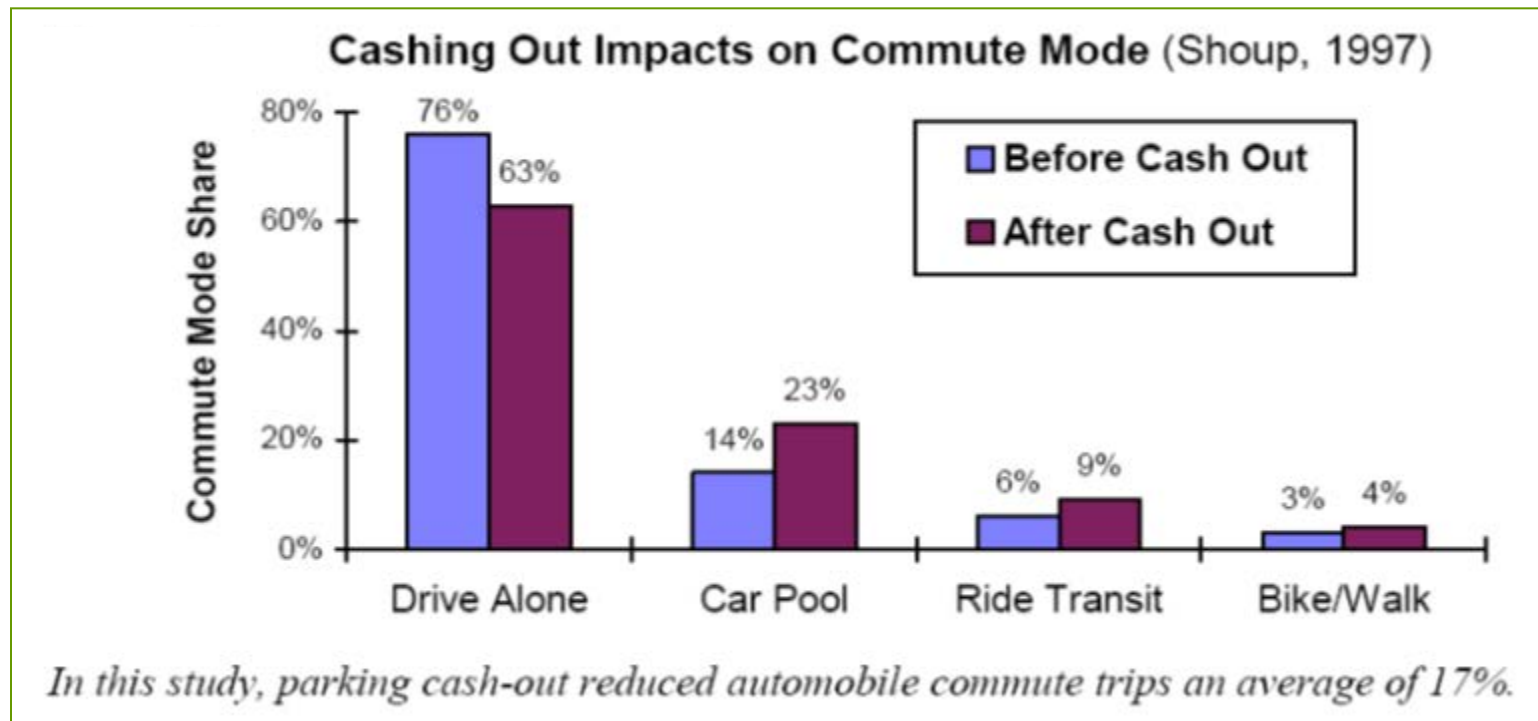
Figure 2-8 Mode shifts achieved with free transit passes

Location	Drive to work		Transit to work	
Municipalities	Before	After	Before	After
Santa Clara (VTA) ⁷	76%	60%	11%	27%
Bellevue, Washington ⁸	81%	57%	13%	18%
Ann Arbor, Michigan ⁹	N/A	(4%)	20%	25%
Universities				
UCLA ¹⁰ (faculty and staff)	46%	42%	8%	13%
Univ. of Washington, Seattle ¹¹	33%	24%	21%	36%
Univ. of British Columbia ¹²	68%	57%	26%	38%
Univ. of Wisconsin, Milwaukee ¹³	54%	41%	12%	26%
Colorado Univ. Boulder (students) ¹⁴	43%	33%	4%	7%

Source: Litman, Todd. “Parking Requirement Impacts on Housing Affordability.” Victoria Transport Policy Institute, 2004.

Parking Cash-Out

Parking Cash Out refers to programs that offers commuters who are offered subsidized parking the cash equivalent if they use alternative travel modes.



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Prof. Don Shoup – “Cruising Argument”

“Vehicles were documented in Berkeley, CA “cruising for on-street parking spaces” in just 30 days the number of vehicles would stretch from the Earth to the Moon.”

Parking Management Best Practices –

- Charging for On-Street Parking at Market Rates frees up spaces and reduces cruising.
- Rates are set to achieve 85% on-street occupancy.
- Pricing adjusted based on demand.

What are best practices in setting parking prices for downtowns?

Pasadena and Redwood City were researched in substantial detail, as these two California cities are widely recognized as implementing best practice parking management strategies.

Pasadena (1993)

- Prior to 1993, all curb parking was free with 2-hour time limits
- Employees and commuters took curb spaces leaving none for customers
- City wanted to install meters to free up curb spaces and increase turnover
- Merchants opposed until city agreed to use all revenue for downtown improvements
- \$1/hr for meters in Old Pasadena core (other meter areas: \$0.50/hr to \$1/hr)
- Meters also run evenings and Sundays
- Results: This Commercial Parking Benefit District generates \$5.4 million annually and parking occupancy rates are consistently near the 85% ideal

Redwood City (2005)

- New development downtown and new downtown planning initiative prompted review of parking management strategies
- Some existing meters (\$0.25 for 1-2 hours, but many streets with high demand not metered)
- Ordinance: Downtown transportation staff tasked with setting meter rates to achieve 85% occupancy goal and authorized to adjust rates administratively as needed to reach this goal
- Initial rates estimated to achieve 85% occupancy:
 - Increased meter rates in highest demand area: \$0.50/hr during weekdays
 - Expanded meter zone to moderate demand areas: \$0.25/hr during weekdays
 - Charged between \$0.25/hr and \$0.75/hr on nights and weekends, depending on demand
- Parking Benefit District established: initial revenues to be used for maintenance and operation of the downtown parking system; revenues beyond this (estimated at 1.4 to \$1.8 billion annually) will be devoted to downtown blocks where the revenues collected of entry
- Eliminated all time limits

Parking Going Green Reducing Parking's Carbon Footprint

Demand-Side Strategies

Improved Transport Options	Incentives to Shift Mode	Land Use Management	Policies and Programs
Alternative Work Schedules	Bicycle and Pedestrian Encouragement	Car-Free Districts	Access Management
Bicycle Improvements	Congestion Pricing	Compact Land Use	Campus Transport Management
Bike/Transit Integration	Distance-Based Pricing	Location Efficient Development	Data Collection and Surveys
Carsharing	Commuter Financial Incentives	New Urbanism	Commute Trip Reduction
Guaranteed Ride Home	Fuel Tax Increases	Smart Growth	Freight Transport Management
Security Improvements	High Occupant Vehicle (HOV) Priority	Transit Oriented Development (TOD)	Marketing Programs
Park & Ride	Pay-As-You-Drive Insurance	Street Reclaiming	School Trip Management
Pedestrian Improvements	Parking Pricing		Special Event Management
Ridesharing	Road Pricing		Tourist Transport Management
Shuttle Services	Vehicle Use Restrictions		Transport Market Reforms
Improved Taxi Service			
Telework			
Traffic Calming			
Transit Improvements			

Discussion