REQUEST TO COMMENT
This form will be included with the record of the meeting as a public document.

Date: 4-5-19  Agenda Item #: 2  □ In Favor  □ Opposed

Name to be called: John C. Wayzka  Representing: Local Private Sector
Address (optional): 720 4th Ave San Diego, CA 92101
Phone (optional): 619-736-7690  Email (optional): jwotzka@gmail.com

Request to Speak: □ Yes  □ No
If you do not wish to speak, you may write any comments below:

1.0 Roads, Rail, High-Speed Rail, Bridges  5.0 Transportation Environmental Issues
2.0 Buses and Bicycle Issues  6.0 Transportation Fiscal Issues
3.0 Parking and MetraPark Issues  7.0 Airport and Global Space Issues
4.0 Pipelines and Treatment Issues  8.0 Border and Customs Issues

SANDAG

Please Submit to the Clerk
REQUEST TO COMMENT
This form will be included with the record of the meeting as a public document.

Date: 3/5/2019

Name to be called: JEFF SPARKSWORTH

Address (optional): 

Phone (optional): 550-386-4275 Email (optional): jsparksworth@gmail.com

Request to Speak: Yes No
If you do not wish to speak, you may write any comments below:

REQUEST TO COMMENT
This form will be included with the record of the meeting as a public document.

Date: 4/5/19

Name to be called: Clait Daniels

Address (optional): 

Phone (optional): Email (optional): 

Request to Speak: Yes No
If you do not wish to speak, you may write any comments below:
REQUEST TO COMMENT
This form will be included with the record of the meeting as a public document.

Date: 4/5/2019

Name to be called: JOHN O’DONNELL

Address (optional): 

Phone (optional): Email (optional): jodonnell@cityoflahabra.gov

Request to Speak: [ ] Yes [ ] No

If you do not wish to speak, you may write any comments below:

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

Please Submit to the Clerk
REQUEST TO COMMENT
This form will be included with the record of the meeting as a public document.

Date: 4/5/19  Agenda Item #: 7  □ In Favor □ Opposed

Name to be called: Jen Hunt  Representing: SDCPC

Address (optional):

Phone (optional):  Email (optional):

Request to Speak: □ Yes □ No
If you do not wish to speak, you may write any comments below:

Support implementing the recommended network sooner than later. Need to have more projects built simultaneously, faster. 70 miles by 2024 is OK, but very small portion of the entire network. Cannot afford 100 years to build out entire Regional Rail Network.

Please Submit to the Clerk

REQUEST TO COMMENT
This form will be included with the record of the meeting as a public document.

Date: 4/5/19  Agenda Item #: 7  □ In Favor □ Opposed

Name to be called: Vianney Rivakraha  Representing:  

Address (optional):

Phone (optional):  Email (optional):

Request to Speak: □ Yes □ No
If you do not wish to speak, you may write any comments below:

Please Submit to the Clerk
REQUEST TO COMMENT
This form will be included with the record of the meeting as a public document.

Date: 4-5-19

Agenda Item #: 7

Name to be called: Nicole Burgess

Representing: BiKESD

Address (optional):

Phone (optional):

Email (optional): Nicole23002@gmail.com

Request to Speak:  Yes  No

If you do not wish to speak, you may write any comments below:

________________________________________________________________________

________________________________________________________________________
4-5-19 Transportation Committee Meeting

1.0 Roads, Rail, High-Speed Rail, Bridges, Busses, Bicycle, and Ride-share Issues

1.1 Roads

1.1.1 Road Construction Materials

1.1.2 Interstate

1.1.2.1 Truck Issues

A 9,000-gal tanker truck leaking gasoline caught fire and triggered multiple explosions in South Los Angeles on 3-17-19 on West Slauson Ave about 7:45 a.m.

Ref: The San Diego U-T 3-18-19 pp. A2

1.1.3 State, County, and City

1.1.3.1 Car Pool Lanes

1.1.3.2 Sidewalks

1.1.4 Parking

San Diego took a step toward becoming a less car reliant city on 3-4-19 by an 8-1-City Council vote, to eliminate parking requirements for new condominium and apartment complexes in neighborhoods near mass transit. The plan will help the city meet the goals of its legally binding climate action plan which requires more people to commute by bicycling, walking, and transit, to reduce GHGs.


1.1.4.1 Parkettes

1.1.5 Streetlights

1.1.6 Fatalities

The number of pedestrians killed in traffic in the U.S. is up to a 3-decade high in recent years. Some 6,227-pedestrians were killed in traffic accidents in 2018 says the Governors Highway Safety Association. Cause were noted as from: speeding, unsafe infrastructure, alcohol use, and SUVs as the biggest causes.

Ref: The San Diego U-T 3-8-19 pp. A2

1.1.7 EV Charging Stations

1.1.7.1 U.S.

1.1.7.2 International

1.2 Rail

1.2.1 Interstate Freight Systems

Groundbreaking was held for a $72.9E6 grade separation project in Moorhead, MN. It will reconstruct and realign the intersection of Southeast Main Ave. and 20th/21st-to pass under new bridges that carry BNSF and Otter Tail Valley Railroad tracks over the streets at a cos of $72.9E6.

Ref: Railway Age, August 2018 pp. 8

- The MA DOT announced 5-grants of more than $1.8E6 as part of the Industrial Rail Access Program to improve rail and freight access, economic opportunity and job growth. It will also get $2,4E6 in private funds.

Ref: Railway Age, August 2018 pp. 8

- Chicago’s rail network sees about 1,300-freight and passenger trains pass through the city/day and plans to simplify traffic is on-going. The $4.4E9 Chicago Region Environmental and Transportation
Efficiency—CREATE—program began in 2003 has 70-rail and highway infrastructure improvement projects and 29-have been completed with $2.0E9 spent primarily through railroad and government partnerships. The U.S. DOT recommended 26-projects that received $1.54E9 in FY-2018 for Rebuilding America—INFRA-grant programs.
Ref: Railway Age, August 2018 pp.14

- Houston, TX-based Stewart & Stevenson manufacturing technologies a Kirby company entered into an agreement with Eastern Lift Truck Co. Inc. of Maple Shade, N.J. as the sale authorized dealership to market, sell, and service Rail King® railcar movers in the mid-Atlantic region.
Ref: Railway Age, September 2018 pp. 7

- Update on the Short Line Safety Institute—SLSI—formed in 2015. It was formed to assure achieving an even-higher level of safety and is funded by a Congressional grant managed by the Federal Railroad Adm. and initially was focused on railroads carrying hazardous materials that was expanded to all short line Railroads for the FY-2018 grant. In April 2018 SLSI announced launch of a new program for short lines and regionals, Hazardous Materials Instructor Training—HMIT—for Class II and III railroads.
Ref: Railway Age, September 2018 pp. 18

- Update on Union Pacific—UP’s Unified Plan 2020” that Implements Precision scheduled Railroading principles” over the last 20-years at Illinois Central, CN, Canadian Pacific, and CSX by E. Hunter Harrison. Using Precision Scheduled Railroading—PSR—. The PSR will shift from moving trains to moving cars, minimizing car dwell, car classification events, and locomotive power requirements; utilizing general purpose trains by blending existing train services, and balancing train movements to improve use of crews and rail assets.
Ref: Railway Age, October 2018 pp. 6

- The state of GA will spend $92E6 to double the Port of Savannah’s annual rail capacity to move more than 1.0E6 containers by 2020. The Director’s approved the spending for the Mason Mega Rail Terminal at its September 17, 2018 meeting to grow total container throughput to 8.0E6-TEU by 2018. It includes 124E3-ft of new track, 88-automated switches, and the rail and power infrastructure to support operation of rail mounted gantry cranes. It will combine current on-dock CSX and Norfolk Southern rail terminals into one facility providing each with at least 9-2,700-ft working tracks to accumulate 10.0E3-ft long unit trains at Garden City Terminal. The system will serve Memphis to St. louis, Chicago, and Cincinnati. The project is funded by $44E6 from “FASTLANE grant in July 2016 for the $128E6 project.
Ref: Railway Age, October 2018 pp. 6

- Short-line RR holding company Iron-horse Resources Inc., acquired AZ-based San Pedro & Southwestern Railroad, and will be named San Pedro Valley Railroad.
Ref: Railway Age, November 2018 pp. 8

- Union Pacific announced in January 2018 a construction of a $500E6 rail classification yard in Southern, TX called Brazos Yard. New technologies are a 3-point hump retarder system, a wider and faster hump yard turnout configuration, wider track centers within the yard, a network of AEI tag readers to help track and trace all due movements, extensive fiber optic system, phased yard-specific wireless communication back bone, a design remote-central locomotive operating plan with locomotive movement controlled by sensors embedded in track, and no road/rail at grade crossings.
Ref: Railway Age, November 2018 pp. 32-35
1.2.1.1 Locomotives

GE Transportation will supply Chilean private transport providers Ferrocarril de Antofagasta—FCAB—with 5-C23EMP diesel-electric locomotives in 2019. The C23EMP, specially designed for FCAB is a single-cab locomotive for light-axle-load operations, low clearances, and narrow gage track.

Ref: Railway Age, August 2018 pp. 8

- Update on BNSF’s mainline fueling station at Hauser, ID that services locomotives that power trains on the western region of the railroads Northern Corridor. Minor spills and containment concerns are also covered.

Ref: Railway Age, August 2018 “Fueling Trains in the 21st-Century” pp. 24-29

- Article on use of HOTSTART for keeping locomotive running on schedule in cold weather without a need for idling in freezing temperatures.

Ref: Railway Age, August 2018 pp. 31-36

- Iowa Interstate Railroad will order 3-new Evolution™ series locomotives from GE Transportation for delivery in 2020, to deliver increasing volumes of grain, ethanol, metals, and other commodities between Chicago and Omaha.

Ref: Railway Age, November 2018 pp. 8

1.2.1.2 Positive Train Control—PTC—

BNSF announced in December 2017 it had installed and was operating under Positive Train Control—PTC—on all mandated subdivisions in advance of the December 2018 interim federal deadline. However, on June 13, it submitted a request to the Federal Railroad Administration for an alternative schedule, a 2-year extension to 2020, because “full implementation status cannot be achieved until all non-BNSF-trains and or equipment operating on its PTC-equipped lines are also PTC-compliant.

Ref: Railroad Age, July 2018 pp. 6

- Updates on methodology to moving beyond existing analog and digital technologies more from analog to 21-Century digital world. In communications, with the PTC mandate and positioning with wireless data was forced on RRs with PTC. The 3rd-core technology IT processing was introduced in the 1960s with back office mainframes to distributed systems via telecommunications. The 4th-core technology, IT architecture [system/data flow] has yet to be fully implemented across the global rail industry using a move from silo-based IT architecture of individual railroad deployments having isolated management systems to an Enterprise IT Architecture, EITA—like that of major passenger airlines. The 1st-strategic LLC [SR] was designed for Kazakhstan’s railroad, KTZ and would be a major step forward for U.S. freight railroads, individually and as an industry. The transition to virtual Railroading includes extending beyond Next Generation Train Control—NGTC—by encompassing traffic management, scheduled operations, asset management, and train crew requirements—CBTC—is used in the U.S. In the European System Train Control System—ETCS is used and not appropriate for U.S. freight railroads due to cost of infrastructure. ETCS level 2 is proven, and level 3 is coming.

Ref: Railway Age, September 2018 pp. 32-35

- The American short line and regional Railroad Association selected Rockwell Collins to assist tenant short lines in creating safety-related documentation required to obtain permission to operate over host railroads PTC-equipped territory.

Ref: Railway Age, November 2018 pp. 8
1.2.2 Construction Materials
Update on the science of railroad wheels. More than 4.0E6 North American rail equipment wheelsets have been registered in Railinc’s Component Tracking program since 2012, under AAR.
Ref: Railway Age, August 2018 pp. 38-39

• The Andersons Inc., on August 1, 2018 signed a $2.2E6 agreement to purchase Freight Car American Inc.’s Danville Railcar Facility, Danville, IL. They will turn the freight car manufacturing plant into a full-service freight and tank railcar repair shop on CSX Transportation’s main line, that can store 400-rail cars. They will provide services of repair, painting, blasting, cleaning, tank car certification, and scrapping. Danville will be the Rail Group’s 21-shop in the U.S., located on the high-volume Midwest Rail Corridor and be operational in the 4th-Q-2018.
Railway Age September 2018 pp. 7

• Update on flang-bearing frog crossing diamonds from the 1970s to 1990s.
Ref: Railway Age, September 2018 pp. 38-41

• Track construction and maintenance service provide RailWorks Corp. finalized an agreement to acquire NARSTCO—manufacturer of steel crossties and turnout crosstie sets in Midlothian, TX.
Ref: Railway Age, October 2018 pp. 7

• Japan’s Hitachi Group reached an agreement with Paul Singer-led hedge fund, Elliott, to purchase the investment group’s 31.8% stake in Italy’s Ansaldo STS for $919.7E6 in its plan to own 100% of the company founded by George Westinghouse as Union Switch Signal in 1881.
Ref: Railway Age, November 2018 pp. 6

• Update on track-ballast installation equipment.
Ref: Railway Age, November 2018 pp. 36-41

1.2.3 Car Types
Freight car order, delivery, and backlog stations for the 2nd-Q-2018 show orders increased to 23,788-cars from 10,348 in the 1st-Q-2018. Car builders delivered 13,071-units, the backlog stands at 65,161-railcars, up 18% from the 1st-Q 2018’s 55,216 cars.
Ref: Railway Age, August 2018 pp. 11

• Update on 2019 Financial Desk Book that covers railcar leasing for coal, grain hoppers, tank rail cars, plastic pellet hoppers, and new locomotives for EPA’s Tier IV emissions standards, including rebuilding locations.
Ref: Railway Age, October 2018 pp. 17-27 and 24-27

• Update on Faster supplies for Railroads.
Ref: Railway Age October 2018 “Hold on Tight”. pp. 28-32

• Update on damage control and protection of rail cars.
Ref: Railway Age October 2018 pp. 33-36

1.2.3.1 Oil and Gas Tank Cars
A June report from PFL Petroleum services, covering the North American rail market, says the crude by rail—CBR—is growing in the U.S. and Canada because of pipeline capacity shortfalls. CP and CN’s crude volumes continue to rise.
- A 1960's Union Tank Car Company in El Dorado, KS—the largest manufacturer, lessor, and maintenance of tank cars in North America, Chicago-based UTLX plans to add more repair capabilities to the facility and create 70-new jobs along the BNSF route, near the center of the country. The shops repair tank cars in ethanol service, and hopper cars moving grain and food products. They will add exterior blast, painting, add buildings, utilities and track on the route.

Ref: Railway Age, July 2018 pp. 6

- Crude by rail is set for growth over the next 18-months, while frac-sand could begin to moderate in the 2nd-half of 2018, as the shift to Permian sands intensifies, says a report from the Midwest Association of Rail Shippers Conference. U.S. crude production is at record levels with 35% fewer rigs than possible by late 2019 and will require more CBR volume, only limited by network congestion and infrastructure that is in place.

Ref: Railway Age, August 2018 pp. 6

- The Greenbrier company’s Inc. and Watco Company’s LLC will discontinue their GBW Railcar Services railcar repair joint venture formed in 2014 by combining their shops into a nationwide network and employees at each location will return to management by their previous operators. The venture was for demand for tank cars in CBR service, including tank car retrofits.

Ref: Railway Age, September 2018 pp. 6

- A June derailment that spilled crude oil in IA involved older tank cars retrofitted to newer safety standards, says federal investigators. NTSB cited 10 of 33 derailed tank cars bound for Houston in a BNSF train, were breached in the June 22, 2018 incident at Doon, IA, spilling 230E3-gal of Canadian crude oil forcing a small-scale evacuation. The tank cars were DOT-117Rs, rebuilt from CPC-1232 cars, says NTSB. The bottom outlet value operating handle was a disengaging mechanism, designed to prevent unintended opening in accidents.

Ref: Railway Age, September 2018 pp. 13

- Transport Canada on September 19, 2018 issued Protective Direction 39—PD 39—that accelerates phase-out of non-jacketed CPC-1232 tank cars for crude oil service as of November 1, 2018, 17-months earlier than mandated. The non-jacketed CPC-1232 and older DOT-111 tank cars will be prohibited from transporting condensates as of January 1, 2019—6-years ahead of schedule. PD 39 comes under Section 32 of Canada’s 1992 Transportation of Dangerous Goods Act, 1992 and is “necessary to deal with an emergency that involves a danger to public safety”. Removal of CPC 1232 [TP14877] unjacketed tank cars from crude oil service in Canada moves up to November 1 from April 1,2020 regulatory requirement. TCI DOT 111 and CPC 1232 [TP14877] unjacketed tank cars from condensate service in Canada moved up to January 1, 2019 from prior April 30, 2025 regulatory requirement. TP14877 refers to transport Canada standard TP14877E “Containers for Transport of Dangerous Goods by Rail” issued December 2013.

Ref: Railway Age, October 2018 pp. 7

- An estimated 64E3 DOT117J [new] and DOT 117R [retrofit] tank cars will be purchased over the 2019-2022-time frame as confidence grows in the tank car demand resurgence, says Cowen and Company analyst Matt Elkott. Trinity, ARI is being acquired by ITE Rail Fund and Greenbrier, as beneficiaries in a market when 58E3-railcars overall will be produced in 2019, up to 2,000-units from their previous forecast. The 64E3-tanker cars will be used for Class 3 flammable liquid service including crude, ethanol,
and other petroleum products. The current fleet is some 85E3-units with a 3% annual growth over the next 4-years driven by Canadian and Bakken CBR gains and increases in other petroleum product shipments. Some 50E3 would come from retrofitting older DOT 111 and CPC 1232 cars.

Ref: Railway Age, November 2018 pp. 10 & 12 & 12

1.2.3.2 Intermodal

1.2.3.3 Box Cars

1.2.4 Urban Light Rail Systems

South Korean Seoul Metro provided consultation for the Ho-Chi Minh city’s light-railway system in 2015.

Ref: Google Alert 3-21-19

- Nashua, NH continued with AECOM to study restoration of commuter rail, needed infrastructure upgrades, and how to pay for it.

Ref: Railway Age, July 2018 pp. 8

- San Diego North County Transit District ordered 5-new Tier 4-compliant Siemens Charger diesel-electric locomotives for service on the Oceanside, San Diego Coaster regional commuter trains.

Ref: Railway Age, August 2018 pp. 8

- The Los Angeles County Metropolitan Transportation Authority—Metro—and the U.S. Transportation Security Adm.—TSA—joined forces to deploy a new advanced portable passenger screening technology to help detect weapon and explosive device security threats. They are the 1st-surface transportation agency in the U.S. to produce such an advanced high-tech security device.

Ref: Railway Age, September 2018 pp. 12

- Light Rail lends $2.7E9 in expansion projects unanimously approved by Atlanta’s Marta Board of Directors. A half-penny tax increase approved by voters in 2016 will fund the improvements of 17-projects under development for 2-years, includes 22-mi of light rail, including a $200E6 funding for the Belt Line light rail system.

Ref: Railway Age, November 2018 pp. 8

- Bentley Systems launched Open Site Designer check for design and construction of civil site projects and announced Open Buildings Station Designer specialized application for designing commuter/inter-city rail and metro stations.

Ref: Railway Age, November 2018 pp. 8

- OR released a Draft EIS for proposed passenger service upgrades between Eugene and Portland on the Pacific Northwest Rail Corridor, following the existing Amtrak Cascades passenger rail route with track signal and communication improvements.

Ref: Railway Age, November 2018 pp. 13

1.2.4.1 Street Cars

The Milwaukee streetcar The Hop, took delivery of it’s 2nd-vehicle from Brookville Equipment Corp. The 67-foot long, 83E3-lb vehicle is part of an order of 5-streetcars on the 2.5-mi system costing $128E6, scheduled to open in November 2018, and will connect the Milwaukee Intermodal Station
to the proposed couture high-rise, and connect downtown to the Lower East Side of Historic Third Ward neighborhoods.
Ref: Railway Age, July 2018 pp. 8

• Update on MTA New York City Transit that is accelerating it’s modernization program with New York City Transit President Andy Byford, for the $40E9 upgrade plan to modernize the New York City subway.
Ref: Railway Age, October 2018 pp. 37-39

1.2.4.2 Autonomous [driverless]

1.2.5 Amtrak

Amtrak was scheduled to open the new $111E6 downtown Raleigh, NC Union Station in July 2018. The city’s passenger traffic totaled 151E3 for the year ending September 30, 2017, the 2nd-busiest station in NC after Charlotte. Amtrak in June added a 4th-roundtrip Piedmont train between Raleigh and Charlotte for a total of 10-trains/day.
Ref: Railway Age, July 2018 pp. 8

• Created as a “for-profit” Corporation, Amtrak has absorbed $41E9 in federal subsidies since 1971. In 1978 Congress redirected Amtrak to be “operated and managed” as a for profit corporation. Amtrak said they were but was contracted by the DOT Inspector General. Amtrak has-to use PTC non-compliant sections of rail lines.
Ref: Railway Age, July 2018 pp. 16

• An update on predictive analytics supporting unified, custom-centric, multi-modal- air, highway, rail, passenger service on the Northeast Corridor—NEC—that stretches 460-mi between Washington D.C. and Boston and through America’s 10-largest metropolitan areas serving 8 of the nation’s busiest airports within an hour’s distance of 60E6-people and hosts 7,500-commuter and 1,200-amtrak trains daily carrying 800E3-people. The NEC is under the care, custody, and control of Amtrak, whose 900-year federally held sweetheart mortgage excuses it from principal and interest payments. Dollars come from 8-separatecommuter agencies operating over the NEC, from Amtrak’s own fares and cash subsidies granted by Amtrak, by state and local governments. Congress says Amtrak needs $60E9 to restore it to a “state of good repair”, and fund over due expansion and improvements. A vision is to transform the management structure of each commuter agency and Amtrak into a unified regional transportation system, to include highway and aviation partners, is presented by retired Joseph H. Boardman who’s been in the Railroad industry since 1997. There is a plan in the works for Congressional hearings called the AIRNET-21 concept, where private-sector management would lease the NEC and self-finance expansion and renewal, earning a profit through a commercial development and assessment of statutorily regulated market-based user charges, on intercity and commuter operators using “Big Data”.
Ref: Railway Age, August 2018 pp. 15

• The fight over the 2008 Passenger Rail Investment and Improvement Act—PRIIA—sections 207 and 213 to improve an abysmal 42% on-time performance for long-distance passenger trains. The sections are on “ice”, 10-years later antitipping new court actions that could extend for years, the status quo, and a legion of lawyers eying another 20-years of arguments. The root of the problem extends to 1970, when Amtrak was created to relieve privately owned railroads of an unfunded mandate to operate intercity passenger trains whose current-dollar, $6E9 annual loss was a burden on stockholders and frequent shippers. The solution was to put Amtrak on freight networks at a regulated fee that was inadequate. In 1973 Congress
mandated passenger priority on freight tracks. They have been in court since 2010 over sections 207 & 213 of the PRIIA.

Ref: Railway Age, September 2018 pp. 16

1.2.6 International Freight Systems

Kansas City Southern announced its U.S. and Mexico subsidiaries will acquire 50-new locomotives from GE Transportation to be delivered in 2019, as well as digital solutions to improve operational and fuel efficiency. It’s GE’s 1st-order since the merger with Wabtec in May 2018. The locomotive’s will be GE’s Tier 4 Evolution™ series locomotives, equipped with GE’s GOLINC™ Platform Optimizer™ System, and Distributed Power LOCOTROL® technologies that optimize power distribution, train handling, brake control, and fuel utilization. GE will introduce a new EdgeLine™ industrial Internet of Things—IIoT—platform with cloud support, to drive device integration for non-native IIoT devices, Android-based devices for Kontron c.k America, and MEN Micro USA devices.

Ref: Railway Age, July 2018 pp. 8 & 14

• The planned merger of Siemens’s Mobility Division and Alstom could be delayed until the 1st-half of 2019 due to preparing for regulatory approval from competition authorities in several countries.

Ref: Railway Age, July 2018 pp. 8

• The Port of Prince Rupert and DP World have agreed on terms for DP World Prince Rupert Fairview Container Terminals next phase of expansion, to boost annual throughput at the country’s 2nd-largest container terminal to 1.8E6-TEUs when completed by 2022.

Ref: Railway Age, July 2018 pp. 8

• The IL DOT in June awarded $241E6 to 23-state freight projects. $49.9E6 went to Chicago DOT to fund the Columbus avenue & Belt Railway Company of Chicago Grade Separation Project. The Terminal Railroad Association of St. Louis intermodal facility in East St. Louis is receiving $1.93E6.

Ref: Railway Age, July 2018 pp. 8

• For more than 100-years grain has embedded in CP’s network. RR grain transportation in Canada has been heavily regulated with federally imposed cap on rates determined by a Maximum Revenue Entitlement Formula. Passage of the Transportation Modernization Act, Bill C-49, raised the cap, providing CN and CP the needed revenue to begin modernizing their grain hopper fleets and accommodate increasing annual Western Canadian crop yields. Both placed orders for new cars from National Steel—NSC—Car, Hamilton, Ontario.: CN ordered 1,000 new 5,431-ft³ capacity cars in its 12E3-car Western Canadian grain fleet composed of CN-owned hoppers, leased cars and customer-owned equipment with average of more than 30-years. CP also placed an order for 1,000-cars from NSC investing more than C$500E3 and expects to place more than 500 in service by the end of 2018. CP is working toward an 8,500-ft-long, power-on consist model for its grain trains increasing the current 112-car maximum to 118 within the 7,000-ft length, a per-train capacity increase of 16% and fit 147 of new cars within an 8,500-ft train design, a 44% increase in size. NSC will hire 300-new Fulltime employees in Hamilton for 550-new jobs.

Ref: Rail Way Age, July 2018 pp. 10

• The state of CT, with help from the U.S. DOT, is funding $769E6 for the New Haven-Hartford Corridor to lure commuters to rails, boost development, and make an inland route a key link in the regions transportation network. Over 10-years, the CTrail Hartford Line got underway June 16, running along the
I-91- Corridor from new Haven to Hartford. and on to Springfield, MA for a cost of $769E6, including state and federal funding of 92%. It will add 3-new stations, 5-interlocking’s, upgraded 70-mi of track, while increasing service frequency on the 6-stop, 46-min trip, to 16-round-trip weekday trains, for $8 one-way, with 12-trains to Springfield.
Ref: Railway Age, July 2018 pp. 12

- Global Mining Rio Tinto marked the 1st-delivery of iron ore by a fully autonomous train, as part of its $940E6 AutoHaul™ programs operating to its port facilities in Western Australia that was approved by Australia’s National Rail Safety Regulator for driverless operation. On July 10, 2018 the train, hauled by 3-GE locomotives carrying 28E3-mt of iron ore, traveled more than 175-mi from Rio Tinto’s Tom Prince mine to the port of Cape Lambert without an engineer in the cab. Personal in the operations center in Perth moved the 900-mi away monitored the train. Locomotives carrying AutoHaul™ software are fitted with on-board cameras, for constant monitoring from the operators center. Systems provider Ansaldo STS-a Hitachi Group Company says the success is a major turning point for heavy haul rail operations globally.
Ref: Railway Age, August 2018 pp 10

- CP moved 25.8E6-mt of Western Canadian grain and grain products, soybeans, and non-regulated principal field crops during 2017-2018 crop year. CP’s current estimate of the Western Canadian crop size is 70.8E6-mt and with carry-over could reach 83.4-mt. Current forecasts are to spot 5,500-hopper cars for Canadian grain/wk through Fall, when the Port of Thunder Bay on the St. Lawrence Seaway Closes. When the seaway closes CP will supply 4,000-cars/wk. CPs Dedicated Train Program allows customers to lock-in unit trains for the entire crop year. It’s Open Distribution Program is segmented to fulfill the shipping needs of less-than-unit-train customers.
Ref: Railway Age, September 2018 pp. A6

- The U.S. Senate and House of Representatives each passed versions of a U.S. DOT 2019 appropriations bill to impose a 1-year ban on new procurements of transit railcars or buses from companies owned or subsidized by Chinese, China Railway Rolling Stock Corporation—CRRC—if the procurement uses any Federal Transit Administration formula or bus funding for FY-2019 H.R. 6147 and includes transportation—HUD Appropriations Bill for company’s not clearly named on the Peoples Republic of China. Funding from the Capital Investment Grant Program § 5309 money for future new starts could be used for Chinese rolling stock or buses. Trump is blocking the other funding over tariff issues.
Ref: Railway Age, September 2018 pp. 8 & 9

- Update on Canadian Nationals’ traffic volume dip of 5% in 2016 and Hunter Harrisons efforts to bring the Railroad back to par.
Ref: Railway Age, September 2018 pp. 20-21, 23-26, 40-41

- Ermewa Group-European lesser of industrial rail cars and tank containers has contracted with Amsted digital Solutions for and end-to-end telematics platform for Ermewa’s digitalization initiatives.
Ref: Railway Age, October 2018 pp. 7

- Update on CPs short line meeting at the headquarters campus on a repurposed railroad yard for the 15E3-mi Class I railroad. Cp is returning to its roots staring with the iconic Canadian beaver in the logo its official symbol for sovereignty, 1st-used in 1886. Until 1960 for a modernistic white-on-red black letters until 2017. They returned to its roots reconnecting with short line and regional railroad partners with the “CP Reconnect 2018” Short Line and Regional Railroad Conference at the Calgary Campus on the Ogden Yard to reconnect with 39-non-class partners.
1.2.6.1 China’s Belt and Road Initiative
   1.2.6.1.1 North Korea
   1.2.6.1.2 Vietnam
   1.2.6.1.3 China

1.2.6.2 Eurasia Routes: China-Europe-and India Routes - Russia trade corridor

   The Greenbrier Companies, Inc. entered the growing freight rail market in Turkey with a major
   ity stake in rail car manufacture Royvag Vagon Sanayi ve Ticaret A.S. [Rayvag]. The country has key
   rail transportation connection between Asia and Europe, and “transcontinental rail shipments through
   Turkey, create a need for European rail standards, favoring Greenbrier’s leadership in design and
   manufacturing. An agreement between Rayvag and Greenbrier’s European subsidiary, Greenbrier-
   Astrarail for 68% ownership stake.

1.2.6.2.1 China’s Belt and Road Initiative TRACECA
   Europe-Caucasus

1.2.6.2.2 INSTC
   Western China-Western Europe Corridor

1.2.6.2.3 Trans-Siberian Railway International North-South Transport Corridor

1.2.6.2.4 Turkmenbashi Seaport
   Located on the Eastern part of the Caspian Sea.

Ref: Google.Com: Turkmenbashi Seaport flash export

1.2.6.2.5 Western China-Western Europe Corridor China-Europe Rail Shipments on
   Russia’s Trans-Siberian Railway

1.2.6.2.6 Port of Batumi and Poti

1.3 High-Speed Rail—HSR—

   Update on HSR in the U.S. that covers the Bullet Train in CA from the Bay Area to Silicon
   Valley, TX Bullet Train from Dallas to Houston, Amtrak’s right-of-way for the Acela Express service
   on the Northeast Corridor, and CT’s High-Speed Rail’s upgraded route for a high-speed Amtrak.
   In FL Brightline’s, All Aboard Florida is going high-speed [79-mph]. Amtrak in 2021 will take delivery
   of new Avelia trainsets built by
Alstom of France to rethink all aspects of the current product. The Avelia trainsets are being constructed by Alstom for a high-end passenger experience to serve the NEC with 33% more passengers/train and it will feature a Tier III standard powertrain.
Ref: Railway Age August 2018 pp. 40-42

1.3.1 Highspeed
   1.3.1.1 U.S. System-in North America—125 to 150-mph
   1.3.1.2 International

Alstom shareholders on July 17 approved more than 95% of the resolutions related to the proposed merger with Siemens mobility, including its traction drives business and must be approved by the antitrust authorities. Closing is anticipated during the 1st-half of 2019. Their meeting also discussed Alstom’s 2020 strategy, FY-2017-2018 highlights, and financial performance. The 14-Boards of Directors were approved by Alstom. Shareholders approved the future Board of Directors of the combined entity Siemens Alstom which will include 11-directors of which 6-are independent and 5-are women. The European Commission will investigate the merger and has until November 21, 2018 to decide if the merger will have a detrimental impact on completion.
Ref: Railway Age, August 2018 pp. 12

1.3.2 Higher-Speed—HrSR—
   1.3.2.1 U.S. Systems in North America—151-230-mph

Texas Central and Renfe On October 2018 signed an agreement that formalizes the relationship of the Spanish train operator as the Texas high-speed train operator. Other partners are Salini Impregilo with its U.S.-based subsidiary The Line Construction Corp. to oversee civil construction to build the line. San Francisco-based Bechtel with offices in Houston will be the project manager supporting Texas Central from development to full implantation. The 200-mph high-speed train connecting North Texas, the Brazos Valley, and Houston, will use the Japanese Shinkansen System—the world's safest system, said Texas Central. In 54-years Shinkansen has had no crashes or failures from operations. It will make the trip in 90-min and is backed by investors, not government grants, making it a new business model for infrastructure projects. Texas Central is reforming and updating construction and planning, and sequencing, guided by the FRA’s recent draft EIS for the 242-mi project.
Ref: Railway Age, November 2018 pp. 6

1.3.2.2 International
1.3.3 Hyper-loop Transport System

Eldon Musk could build an express tunnel transit system in Las Vegas after setbacks in other cities. The Las Vegas tourism agency recommended baking him with a contract for an underground tunnel system, where autonomous electric vehicles would whisk people around a mega convention center and the casino-filled corridor, by 2021. The convention center hosts more than 1.0E6-people/yr.
Ref: The San Diego U-T 3-7-19 pp. C1 & C4

1.4 Bridges
   1.4.1 Bridge Construction Materials
   1.4.2 Interstate
   1.4.3 State, County, and City
   1.4.4 International
   1.4.5 Railroad
1.5 Buses
   1.5.1 Bus Rapid Transit
   1.5.2 San Diego Metropolitan Transit System
   1.5.3 Shuttle System
   1.5.4 Fueling Terminal

1.6 Bicycle
   1.6.1 Accidents
   1.6.2 Bike Share Program
   1.6.3 Bike Trails

1.7 Ride-share, Delivery and Transportation-networks
   1.7.1 Uber
   1.7.2 Lyft
   1.7.3 Harley-Davidson
   1.7.4 Electric Scooters

   The city of San Diego is facing a lawsuit filed by a disabled man who said he was injured when teenagers on an electric scooter lost control and caused a bicyclist to slam into his wheelchair in Pacific Beach in July 2018.

   • Scooter company Bird Rides Inc. abandoned its practice of paying independent contractors a per-vehicle rate to fix its scooters in several cities.
   Ref: The San Diego 3-12-19 pp. C1 & C4

   • A 53-year old rider of a scooter hit a tree on 10th Ave. near C St. and died from injuries.
   Ref: The San Diego U-T 3-17-19 pp. B1 & B3

   1.7.5 Skyway System
   1.7.6 Segway Tours
   1.7.7 Self-driving Air Taxi
   1.7.8 Wheels

2.0 Port and Military Issues

2.1 Ports
   2.1.1 Container Ships

   Espoo, Finland, headquartered Valmet will supply, exhaust gas cleaning systems for 7-newbuilding container ships that are over 23E3+ each—the worlds largest. They are on order for Hyundai Merchant Marine at South Korea’s Daewoo Shipping and Marine Engineering.
   Ref: Marine Daily 3-27-19

   2.1.1.1 Regulation
   2.1.1.2 CNG, LNG, LPG, and Articulated Tug and Barge—ATBs—vessels
   2.1.1.3 Crude Oil
      2.1.1.3.1 Mobile Offshore Drilling Unit—MODU—
   2.1.1.4 Reefers

   2.1.2 Cruise Ships

   The 1,070-ft Norwegian Escape departed Cape Liberty Cruise port, across the Hudson from New York City about 3:00 p.m., bound for Port Canaveral, FL to the Bahamas 3-days later. Weather was
expected stormy but not severe. Shortly before midnight the ship lurched port-side and tables, chairs, and cutlery became projectiles. As they were northeast of the Delmarva Peninsula [land mass south of DE]. The ship was not damaged by the wind of 100-knots [110-mph] equalevent to a category 3-hurricane.

Ref: The San Diego U-T 3-7-19 pp. A3

- The Norwegian cruise ship Viking Shy disabled issued a mayday call and a helicopter rushed to evacuate 4,300-passengers and crew, as it drifted toward the rocky shore. Weather conditions were wind gusts up to 43-mph and 26-ft waves in frigid waters. Most passengers were Americans and British.

Ref: The San Diego U-T 3-24-19 pp. A4

2.1.3 LNG and CNG Terminals
2.1.4 U.S.

The San Diego Unified Port District is suing California State Universitys Board of Trustees for failing to pay for more than $337E3 in damages to the Broadway Pier, says federal records. The damage was from a military training ship owned and operated by the California State University Maritime Academy.


2.1.4.1 Inland Waterways

The New York state DOT awarded $19E6 to construction of central NY’s 1st-Inland Port in De Witt, NY to move containerized freight between the Port of NY & NJ and the existing CSX terminal east of Syracuse, NY.

Ref: Railway Age, August 2018 pp. 8

- NYC will invest $100E6 to streamline freight infrastructure while reducing truck emissions and creating thousands of jobs in NYC. The “Freight NYC” unitive will expand use of rail and water to move food, building materials, and other goods that are trucked in from outside the 5-boroughs from the site of the Brooklyn Army Terminal adjacent to the New York New Jersey Rail car float, a rail hub near the John F. Kennedy Intl. Airport in Queens, and a barge terminal on 5-aces in the Bronx.

Ref: Railway Age, August 2018 pp. 13

2.1.4.2 Drayage Truck Issues
2.1.5 International

2.1.5.1 China’s 21-Century Maritime Silk Route Economic Belt—Belt and Road Initiative—B & RI—

2.1.5.2 Mexico’s Rail line between the Pacific and Atlantic Oceans

2.1.6 Maintenance Operations

2.1.6.1 Ice-breakers

2.1.7 Logistics

2.1.7.1 E.U.-China Logistics and Supply

2.1.8 Hybrid and Electric Fleets

2.1.9 Autonomous Navigation Systems

2.2 Military

President Trump sent Congress on 3-11-19 a $4.75E12 budget plan for FY-2020, the largest in history that has: a 50% increase for the military, additional $8.6E9 for the border wall, $1.9E12 cost savings from mandatory safety programs.

- The U.S will spend $25E9 on nuclear weapons in 2020 to counter China’s advancements in long range missiles with nuclear weapons—with China, Russia, and the U.S. the only nations with long range capabilities. China also has hypersonic missiles, space launches enabling wars in space, and issues in the South China sea. Bonnie S. Glaser director of China Power Project at the Center for Strategic and International Studies says the U.S. is far behind China’s military capabilities.

Ref: The San Diego U-T 3-17-19 pp. A6

- The Pentagon provided Congress with a list of 400-military construction projects around the world with dozens in CA at a cost of $12.8E9. There are 31-projects in CA with a cost of $1.1E9, including $600E6 in San Diego.—Boeing is facing a strong case for liability in the crash of 2-737 Max jets. Indonesian Lion Air had 189-passerger and Ethiopian Airlines killed 187passengers. Norwegian authorities sent Boeing a bill for revenues from lost flights over grounding their jets.


2.2.1 Ships and Planes


Ref: Direct Expose 2-27-19

- Huntington Ingalls Industries Newport News Shipping Division has reached a 50% complete stage of the overhaul of the nuclear aircraft carrier USS George Washington CVN 73—that was christened on July 21, 1990, in installing the carriers 32-ton section of the main mast. The ship arrived at the shipyard in August 2017, and put in dry dock for the overhaul, and will be delivered to the Navy in 2021.

Ref: Marine Daily 3-18-19 and Google.com: Newport installs upper mast of CVN 73

- Huntington Ingalls Industries, Pascagoula, MS was awarded a $1,471,290,667.00 modification to a previously awarded contract for the procurement of the detail design and construction of Landing Platform Dock [LPD] 3, the 1st—LPD 17 Flight II Ship. The additional capabilities of LPD Flight II will support new and emerging U.S. Marine Corps and Navy requirements such as the ship-to-shore connector, CH-53 K helicopter and improved troop armory/weapons stowage.
• The U.S. Air Force outlined a 5-year RIAT Plan to push Boeing Companies F-15 fighter in an upgraded version, a $7.8E9 investment to jump from 8 planes in 2020 to 18-each year through 2024. Lockheed Martin Corp’s newer F-35 would get $37.5E9 over 5-years. The new service now plans to buy 48-F35s each year from 2021 to 2023 instead of 54 previously planned. The Air Force also wants 80-F-15X models—the 5th-generation models. Northrop Grumman Corp’s B-21 stealth bomber will get $20E9 over the next 5-years. Boeing will get $19E9 through 2024 for 66- KC-46 tankers. They will spend $12.4E9 through 2024 on Space Systems. The Air Force’s New Space Force will get $363E6 through 2024. The total spending for the F-35 fighter-jet program will be $1.5E12.

Ref: Bloomberg 3-18-19 and Google.com: lockheed f-35 dinged as boeing f-35-x wins in air force’s plan

• Adm. Karl Schultz, the top Coast Guard Commandant, said the Coast Guard is approaching a tipping point for requiring more money. He is thankful for funding for new vessels, but the service still has an operational budget that is essentially been flat-lined over the last 8-years. They have a backlog of $1.7E9 for shore infrastructure projects. He requested a 5% increase in the services in 2020 operations budget up to $7.9E9 and an overall budget of $11.34E9 up from $10.6E9.

Ref: The San Diego U-T 3-22-19 pp. A10

2.2.2 International Issues

Juan Guaidó, the Venezuelan opposition leader who defied a travel ban and left the country a week ago returned and gave a speech before cheering crowds in defiance of President Nicola’s Maduro. President Maduro said he would arrest Guaidó.—President Maduro of Venezuela denounced his opponents on 3-5-19 at a military ceremony—not mentioning opposition leader Juan Guaidó who continues to try to topple Maduro with appeal for support from state unions, long reliant on government handouts.—Venezuela’s government expelled the German Ambassador and detained a U.S. free-lance journalist in Caracas, as President Maduro sought control amid Western-backed opposition to unseat him.—Power is out, no water, no internet, and inflation is 10.0E6%, compelling about 10% of the population to flee the country. It was the richest country in South America with its oil reserves.—Another power shutdown has pulled Venezuela down further with loss of electricity and telecommunications.—An explosion rocketed a power station in the Venezuelan capital early 3-12-19 adding to widespread nationwide power cuts. Flames rose overnight from the electrical facility in the Bauta area of Caracas and was blamed on government corruption and mismanagement. Critical conductors had overheated at the hydroelectric station at the Guri Dam. Minister Jorge Rodriguez described it as a cyberattack on the dams machines whether to boost or diminish power based on capacity and demand.—Some 1,000-members of Venezuelan security forces have fled to Columbia since February 2019. The deserters received lodging, health care, legal aid and were accompanied by 400-family members.


• 100’s of people including Islamic State fighters, evacuated the extremist groups last foot hold in eastern Syria on 3-4-19, after U.S. backed Syrian fighting slowed their offensive to allow a way out of the tiny enclave.


• The Kurdish-led Syrian Democratic Forces—SDF—moved toward a tent encampment in the village of Baghouz, Syria and circled a group of ISIS militants, killing several them in an hour battle. SDF said it will go on until they are wiped-out.—U.S. backed Syrian forces on 2-19-19 seized control of an encampment
held by the Islamic State in eastern Syria, after hundreds of militants surrendered overnight. They are suspects in a January bombing that killed 4-Americans in North Syria that were captured by Kurdish-led forces.
Ref: The San Diego U-T 3-12-19 pp A7 and 3-20-19 pp. A3

* China announced a robust annual economic growth target and a 7.5% rise in military spending on 3-6-19 as it converted an annual legislative session overshadowed by a tariff war with Washington. Seeking to complaints the Chinese’s system is rigged against foreign companies. Premier Li Keqiang promised in a speech to its National Peoples Congress that they would be “treated as equals” with their Chinese competitors.
Ref: The San Diego U-T 3-6-19 pp. A3

* The Afghan Taliban rejected a proposal that would result in the U.S. forces being withdrawn from the war-torn nation in 5-years. The rebel group wants them out within a year. Peace talks restarted after a 2-day break for internal deliberations.
Ref: The San Diego U-T 3-6-19 pp. A3

* An Afghan Army base was destroyed on 3-13-19 by U.S. airstrikes that followed a fire-fight between Afghans and Americans. An Afghan unit attacked a joint convoy of Afghan Special Forces and U.S. troops—“an example of the fog of war”.
Ref: The San Diego U-T 3-14-19 pp. A3

* North Korea begun rebuilding work on a satellite rocket launch pad and engine test site at the Sohae Satellite Launching Station begun between February 16 and March 2, 2019. Close to the time of breakdown of the summit meeting between President Trump and Kim Jung Un, in Hanoi.
Ref: The San Diego U-T 3-6-19 pp. A5

* President Trump says his relationship with North Korea remains “good” and he hopes it gets better, despite work at the Sohae Satellite Launch Station in the hills, northwest of Pyongyang. A 3rd-summit has not been scheduled and the next stage will be at lower levels. Steve Biegun had lunch on 3-6-19 at the State Department, with his counterpart from Japan, and South Korea—planning for U.S.-South Korea-North Korea, 3-way talks, to put nuclear diplomacy back on track. South Korea’s Suh Hoon—Director of South Korea’s National Intelligence Services told lawmakers in Seoul, North Korea was restarting facilities at a rocket launch site that was dismantled in 2018.
Ref: The San Diego U-T 3-7-19 pp. A3

* Kim Jong-Un likely to take position “formally” representing North Korea as a formal head of State says Yong-hoa former North Korean diplomat. Kim is the de faco to chief ruler of the North Korean regime, as chairman of the ruling Workers Party of Korea, as well as chairman of the State Affairs Commission and Supreme Commander of the Korean Peoples Army. Kim Yong-nam, President of the Presidium of the Supreme People’s Assembly—SPA—, has held the position of the ceremonial head of the State since 1998, making it difficult for Kim to be recognized as the head of the state diplomatic occasions for National Days. The Constitution says Kim Yong-nam represents North Korea to the outside world and Western countries that emphasize law, could not send congratulatory messages or formal letters to Kim Jong-Un. The process is necessary for Kim to sign declarations of war or peace treaties forged by multilateral consensus.
On March 10, 2019 North Korea held a Nationwide “parliamentary” election where 687-Supreme People’s Assembly—SPA—members from each constituency were named for 5-year-terms.—President Trump on 3-22-19 reversed new sanctions on North Korea that the Trump Adm. rolled out on 3-21-19.—North Korea
abruptly withdrew its officials from an inter-Korean liaison office in Kaesong [Gaeseong], North Korea in a peaceful interaction of North Korea and South Korea for more than 1-year, and 3-weeks after the 2nd-summit with President Trump. The directive came from a Superior Authority and said the South could stay if needed. Seoul’s Vice Unification Minister Chun Hae-Sung said the South will continue to staff the liaison office normally.

Ref: Google.com: kim jong-un likely to take position “formally” representing north korea and Korea Times 3-23-19, Microsoft News 3-22-19, and The Korea Times 3-23-19

• North Korea is considering suspending denuclearization talks with the U.S. unless Washington changes its stance after the breakdown of a summit meeting in Hanoi between Trump and Kim, says Vice Foreign Minister Choe Son Hui told foreign diplomats, and Secretary of State Pompeo said, she left open the possibility negotiations will continue. They also said relations between Trump and Kim as “mysteriously wonderful”, and the U.S.’s gangster -like stand is dangerous.

Ref: The San Diego U-T 3-16, 2019 pp. A3

• Satellite images suggest North Korea was preparing to launch a space rocket before the breakdown of the 2nd summit in Hanoi. There is activity at the Sanumdong facility. President Trump left the summit after Kim asked for all U.S. sanctions to be lifted, in exchange for dismantling of the countries main nuclear complex. North Korea blew up the entrances to the major under ground testing site at Punggye-ri in May 2018, but never let inspectors in. In the time between the 1st and 2nd-summits, North Korea produced enough uranium and plutonium to fuel a half-dozen new nuclear missiles.

Ref: The San Diego U-T 3-10-19 pp. A4

• Defense Ministry spokeswoman Choi Hyun-soo said the U.S. and South Korea militaries are sharing intelligence over the developments at North Korea’s missile research center in Sanumdong near Pyongyang and a long-range rocket site. President Trump said time will tell if efforts to get North Korea and Kim Jong Un to give up his pursuit of nuclear weapons in exchange for relief from sanctions, stalling economic growth.

Ref: The San Diego U-T 3-8-19 pp. A3

• There are some 1.0E6 Korean visitors to Da Nang, Vietnam now, so South Korea—The Republic of Korea—Rok— will open a Consulate General office to meet the needs of its citizens visiting the city, that was approved on March 19, 2019. The Rok also has an office in Latvia.

Ref: Google Alert 3-21-19

• Army General Scaparrotti told the Senate Armed Services Committee on 3-5-19 the U.S. and its allies were still looking at options after the Trump Adm. withdrew from the Intermediate Range Nuclear Forces Treaty on February 1, 2019 triggering a 6-month period before the formal dissolution, and work with NATO.

Ref: The San Diego U-T 3-6-19 pp. A6

• President Trump proposed a budget for FY-2020 that will seek money for a border wall and Space Force with $750E9 for Defense. It will cut international programs for foreign aid, environmental protection, and transportation and require Americans to work.

Ref: The San Diego U-T 3-9-19 pp. A14
• The Trump Adm. is seeking more money for allied European and other nations where American troops are based. Trump wants 2% of NATO nations GDP for defense. The U.S. also has troops in Germany, England, Japan, Italy, Kuwait, Qatar, Bahrain, and 28,500 in South Korea.
Ref: The San Diego U-T 3-10-19 pp. A7

• Germany said it would fall significantly short of NATO’s military spending goals, annoying the U.S., risks provoking Washington further by failing to reach even its own goals slimmed down target.
Ref: The San Diego U-T 3-20-19 pp. A11

• Russel Nelson of The Church of Jesus Christ of Latter Day Saints, [Mormons] showed off a huge new temple in Rome with statues of a Christ with statues of apostles. The temple is oval-shaped marble house of worship crowning a hill top. [note: to period of Flavius Josephus, Google.com]
Ref: San Diego U-T 3-10-19 pp. A4

• The U.S. Military has escalated a battle against al-Shabab, affiliated with al-Qaeda in Somalia as President Trump seeks to scale back operations against similar Islamist insurgencies elsewhere in the world from Syria and Afghanistan to West Africa.
Ref: The San Diego U-T 3-11-19 pp. A10

• The U.S. Senate voted on 3-13-19 to end U.S. support for the Saudi Arabian-led coalition war in Yemen—Congress going against President trump’s foreign policy.
Ref: The San Diego U-T 3-14-19 pp. A3

• Secretary of Defense Patrick Shanahan said the Pentagon would not demand countries with U.S. troops in their territories to pay full cost of hosting those forces+50%.

• Israeli war planes attacked militant targets in the Gaza strip in response to a rocket attack on Tel Aviv.

• President Trump declared on 3-21-19 Israel’s authority over the long disputed, Golan Heights, a war that has been going on since the U.N. rejected Israel’s occupation of the Golan Heights since 1967, when they seized the 400-mi² piece of rocky highlands from Syria during the Arab-Israeli war. It could also undermine Trump’s peace proposal for Israel and the Palestinian’s. Arab leaders also face a prospect of acquiescing the loss of land they had long claimed as Arab.

• UN investigators began exhuming some 12E3-victims of ISIS abusing and killing Yazidis and other religious minorities in Iraq in 2014. ISSIS is Sunni Muslim extremist group that persecutes religious minorities in Syria and Iraq.
Ref: The San Diego U-T 3-17-19 pp. A6

• President Trump said he would work to designate Brazil a “major non-NATO ally and even full NATO membership as he welcomed Jair Bolsonaro.
Ref: The San Diego U-T 3-20-19 pp. A5

• The Secretary of State Mike Pompeo and his wife, Susan spent much of the 2nd-day of their visit to Lebanon touring historical churches and centuries old citadel.
Ref: The San Diego U-T 3-24-19 pp. A7
2.2.3 Army Corps of Engineers—ACE—

2.3 Shipping Canals
2.3.1 Panama Canal
2.3.2 Suez Canal
2.3.3 Nicaragua Canal—Nicaraguan canal and Development Project
2.3.4 Artic Route

3.0 Water Issues
3.1 Regulation
3.1.1 Water Rights
3.1.2 Conservation Mandates
3.1.3 Funding
3.2 Rivers and Lakes
3.2.1 Dams

FEMA rejected $306E6 of the $639E6 costs for the Oroville Dam repairs, that CA requested. It took $1.1E9 to repair the dam and spillways. The site has a hydroelectric Edward Hyatt power plant with 3-conventional hydro turbines and 3-pumped storage generators that were built on 1968.
Ref: The San Diego U-T 3-10-19 pp. A25 and google.com: the hyatt power plant at Oroville dam 2/13/17

3.3 Reservoirs and Aqueducts
3.4 Ground Water
3.5 Recycled Water
3.5.1 Municipal Waste
The City Council of Coronado asked staff to move forward with a proposal to build a $24E6 sewage treatment facility on the Coronado Gulf Course. The plant will operate at a deficit for at least the 1st-14-years and not break even for 30 to 35-years. The objective is for the city to do the morally and ethically corrective action, using portable water to irrigate the city’s green spaces and have a drought-proof source of irrigation water. The facility will provide 750E3-gal/d, gulf fees will go up $10, and they will also sell the excess recycled water. Coronado pays a fee to have its sewage treated in San Diego.
Ref: The San Diego U-T 3-22-19 pp. B4

3.5.2 Desalination
3.5.3 Storm Drain

3.6 Municipal Water System Contamination

4.0 Pipelines and Tunnel Issues
4.1 Pipelines
4.1.1 Water
4.1.2 Sewer Lines
In May 2019 areas of the La Jolla Shores and La Jolla Heights will undergo a pipeline replacement project to replace more than 7-collective miles of underground sewer lines.

4.1.3 Storm Lines
4.1.4 Gray Water
4.1.5 Oil and Gas
4.1.5.1 U.S.
4.1.5.2 International

In August 2017 members of an indigenous group in Mexico hopped on a backhoe and took out a 25-ft section from a natural gas pipeline operated by IEnova, the Mexican subsidiary of Sempra Energy. The Damage has since shut down a section of a 500-mi line that transports natural gas from AZ to Mexico’s Pacific coast. Sempra says after 19-months the pipeline may soon be back in operation if the Mexican government can work with the people—the Yoemi troop of the Yaqui Community of Loma de Bá Cum.

Ref: The San Diego U-T 3-5-19 pp. C1 & C4

4.1.5.3 Natural Gas Leaks

5-Vista downtown businesses and a nearby mobile-home park were evacuated on 3-19-19 after a construction backhoe broke open a 4-in high pressure natural gas pipeline on Pala Vista Drive and Mercantile street.


4.1.5.4 Oil Spills

4.2 Tunnels

4.2.1 Transportation

4.2.2 Water

4.2.3 Tunnel Boring Machines—TBMs—

5.0 Transportation Environmental Issues

New vehicles in the U.S. from 2017 averaged gas mileage of 24.9-mpg, says the EPA, up only 0.2-mpg, falling short of 1.0-mpg required under standards enacted during the Obama Adm. To make up the difference automakers used credits for zero emissions and other fuel-saving measures, not included in EPA test cycles indicating the auto industry will have problems meeting stricter standards by 2025.

Ref: The San Diego U-T 3-7-19 pp. C3

5.1 Maritime Transportation Emissions

5.1.1 Ship Engines

5.2 CO₂ Emissions

5.3 NOₓ Emissions

5.4 SO₂ Emissions

5.5 PM Emissions

5.5.1 PM₁₀-mm

5.5.2 PM₂.₅-μm

5.5.3 PM₁-μm

5.6 Ozone-Ο₃ Emissions

5.7 Industrial and Commercial Emissions

The California Air Resources Board wants to beef up its mandatory air-quality reporting for industrial businesses, such as cement plants, refineries, and oil and gas production.


• Analysis of sewage from 74-cities in 60-countries around the world show drug resistance bacteria are present in many health people living in other areas near South America, Africa, Middle East and Asia. North America West Europe, Australia, and New Zealand had the lowest levels.
5.8 Surface Transportation Emissions
   5.8.1 Rail
   5.8.2 Automobile
   5.8.3 Truck
5.9 Air Transportation
5.10 International
   5.1.1 China
6.0 Transportation Financial Issues
6.1 Ports
   6.1.1 Inland Waterways
6.2 Container Ships
6.3 Federal Highway Trust Fund
   6.3.1 Gasoline Tax
   6.3.2 Millage-based Driving
   6.3.3 Diesel Tax
6.4 State, County, and City
   Transportation officials said the San Diego region will be short the tax needed to complete improvements promised to voters in coming decades by more than $10.0E9 of the $30.0E9-needs for projects slated for completion through 2048. SANDAG collects sales-tax money from the Transnet that funds the region’s transportation projects, secures state and federal matching dollars, and oversees construction.

6.4.1 Parking
6.4.2 Gasoline Prices
   With oil prices up, gasoline’s price is moving up in CA. A recent fire in a Los Angeles refinery will raise the price more. About 10¢/gal, after Phillips 66 shut down a crude unit at the refinery after the fire on 3-15-19. The fire was not as bad as the one in Torrance in 2015, or Richmond in 2012.

6.4.3 Diesel Prices

6.5 Rail, HSR, and Light Rail
   Fuel is one of the largest costs for railroads and for the entire logistics industry. Oil prices recovered from 250% of the February 11, 2016 WTI spot price of $26.19/bbl and are now at the 10-year average of $8/2008 to 7/2018 WTI average of $45.81/bbl. Considering that diesel prices are on the minds of executives and they are looking for alternatives. Additional factors include a continued push for improved emissions—CARB letter for Tier 5 emissions dated April 2017, truck efficiency improvements [platooning and aerodynamics] and continued shift toward natural gas, CNG, and LNG. Other alternatives are alcohols [methanol and ethanol] hydrogen, and batteries. Battery performance has improved economically from $1,000/kWh to $200/kWh in 2018 and is projected to be about $90/kWh by 2030, from advancements of EVs and battery storage advancements. The battery use is being expanded to Class 8-trucks also pushes the technology to locomotives. Railroad locomotives consume more than 90% of the diesel fuel in North American railroading. A modern diesel-electric road locomotive carries an average 5,000-diesel gallons
[equalevent to 180E3-kWh] and refuels every few days in normal operation. Refuels time is less than 30-min for diesel, that guided AAR M-10004 specifications for fuel tenders. Article covers state of the art of battery technology.
Ref: Railway Age, September 2018 pp. 28-31

6.6 Airport

7.0 Airport and Global Space Issues

7.1 Airport

President Trump will nominate former airline executive Stephen Dickson to head the Federal Aviation Adm.—a former Delta Airlines executive.
Ref: The San Diego U-T 3-20-19 pp. A7

7.1.1 Planes

More on Ethiopian Airlines flight 302 crash on 3-10-19 that may have the same problems as Lion Air, flight 610 in October 2018. Both had erratic flight paths killing everyone on board.

7.1.2 Regulation

Boeing’s stock dropped on 3-11-19 after the crash of the newest version of the 737 Max. The 1st was Lion Air’s crash into the Java Sea off Indonesia in October 2018. There are 5,000-more planes in the pipeline to be built. The drop in Boeing’s stock on 3-11-19 wipe $13E9 off the company’s market value. China ordered 104 737 Max planes and taken delivery of at least 70.
Ref: The San Diego U-T 3-12-19 pp. C1 & C4

• Pressure to ground all 737 Max 8 jets is growing, President Trump said pilots are not needed in those planes models, and the planes are too complex, but computer scientists can do the job. The E.U. also grounded the planes, grounding 67% of all planes operating in the global system. By 3-12-19 the U.S. was the only country still using the planes with FAA approval.
Ref: The San Diego U-T 3-13-19 pp. A1

• The U.S. grounding of Boeing’s 737 Max aircraft on 3-13-19, was announced by President Trump after safety regulators in 42-countries banned flights by the jets that are grounded worldwide now. Airlines may cancel orders for the planes.—Aviation regulators worldwide laid down a stark challenge for Boeing to prove that it’s grounded 737-Max jets are safe to fly over suspicions of faulty software might have caused the crash that killed 346-people in less than 6-months. The software is being changed to prevent an aerodynamic stall if sensors detect the jets nose is pointed too high and speed is too slow.

7.1.3 Infrastructure

San Diego leaders are pushing to get people to the SDIA and an imminent selection is to use a shuttle. Using autonomous cars could start soon, as the agency’s Grand Central Station could take 5-years to complete.
Ref: The San Diego U-T 3-9-19 pp. C1 & C4

7.1.4 Air Freight

7.1.5 Safety
Airlines in Ethiopia, China, Indonesia, and elsewhere grounded the Boeing 737-Max 8 jetliner on 3-11-19 after the 2nd devastating crash of the planes from service. The planes 2-flight recorders were found outside the capital of Addis Ababa. The 737 Max 8 was introduced in 1967 and is the world’s most common passenger jet. Other airlines that grounded the planes are AeroMexico, Caribbean carrier Cayman Airways, Comair in South Africa, and Royal Air Maroc in Morocco. Airlines still using the planes are: Southwest, American, and Air Canada.

Ref: The San Diego U-T 3-12-19 pp. A1, A3 & C1

7.1.6 U.S.
7.1.7 International

2-San Diego entrepreneurs and a Coronado businessman were among 5-people killed in Kenya when their helicopter crashed in Central Island National Park, on an Island in Lake Turkana.

Ref: The San Diego U-T 3-5-19 pp. A1 & A8

- An Ethiopian Airlines jet faltered and crashed Sunday shortly after takeoff from the countries capital, killing 157-people from 35-countries. The crash was like that of the Lion Air jet that plunged into the sea off Indonesia minutes after takeoff in 2018. Both involved the Boeing 737 Max 8. China ordered grounding of the 737 Max planes and Cayman Airways said it was grounding its 2-new 737 Max jets.


7.2 Global and Space
7.2.1 NASA
7.2.2 U.S.

Space X’s swanky new crew capsule returned to Earth from the ISS to an old fashion splashdown in the Atlantic on 3-8-19 6-hours after releasing from the space station. The test lasted 6-days on the new crew transport vehicle.

Ref: The San Diego U-T 3-9-19 pp. A11

7.2.3 Moon
7.2.4 Planets
7.2.4.1 Mars
7.2.4.2 Saturn
7.2.4.3 Pluto
7.2.4.4 Jupiter
7.2.4.5 Neptune
7.2.5 Comets and Asteroids
7.2.6 Deep Space
7.2.7 International
7.2.7.1 International Space Station—ISS—

8.0 Border and Culture Issues
8.1 Border
8.1.1 Import-Export

The U.S. FDA confirmed asbestos in some of Claire’s makeup, sparking needs for more cosmetics regulatory safeguards. The FDA has been following Claire’s products since 2017.

Ref: The San Diego U-T 3-7-19 pp. A2
• The U.S. imported more goods than ever in 2018, including a record amount from China, resulting in a $891.3E9—the historic high—trade deficit with the rest of the world. Increases were driven by the global economic slowdown and strength of the dollar which weakened over seas demand for U.S. goods. It was also exacerbated by Trump’s $1.5E12 tax cut, financed by government borrowing, and the trade war he escalated in 2018.

Ref: The San Diego U-T 3-7-19 pp. C2

• 23% of seafood sold in San Diego is mislabeled and 21% nationwide were mislabeled. The most-crazy thing found was wild lobster was substituted with farmed fresh-water prawns.

Ref: The San Diego U-T 3-8-19 pp. A1 & A8

• Britain’s Parliament leader Andrea Leadsom said E.U. leaders are accusing Britain of failing to put forward detailed proposals and offering solutions made, that were rejected months ago because they would threaten ties to Northern Ireland.

Ref: The San Diego U-T 3-10-19 pp. A19

• 2-prominent Brexit backers are warning Prime Minister May not to seek a delay to Britain’s scheduled March 29, 2019 departure from the E.U.

Ref: The San Diego U-T 3-11-19 pp. A3

• The New York State Attorney General’s office on late 3-11-19 issued subpoenas to Deutsche Bank and Investors Bank for records relating to financing of 4-major Trump Organization projects.

Ref: The San Diego U-T 3-12-19 pp. A3

• British lawmakers voted on 3-13-19 to block the county from leaving the E.U. without a divorce agreement—an attempt to delay that departure on March 29, 2019. The Parliament will decide today whether to put the brakes on Brexit, as the vote has political but not legal force. To stop it Brexit, it needs to be canceled, or secure a delay but it still needs E.U. approval.

Ref: The San Diego U-T 3-14-19 pp. A3

• British lawmakers voted on 3-14-19 to delay Brexit for weeks or months by a raucous Parliament. Article 50 in the E.U. Treaty was initiated 2-years ago.


• China’s ban on certain plastics and papers is complicating San Diego’s efforts to dispose of recycled plastics, and papers. City contracted companies that sort and market recycled waste from aluminum cans to junk mail to newspapers, said they have no market for the materials anymore. Some 25% of curbside recycling in CA is contaminated with non-recyclable trash.

Ref: The San Diego U-T 3-17-19 pp. A1 & A21

• President Obrador of Mexico is relaxing strict regulations for businesses to participate in his ambitions effort to stimulate Mexico’s border economy by slashing income and corporate taxes for companies doing business in the border areas.


• The speaker of Britain’s House of Commons said the government couldn’t keep asking law makers to vote on the same deal they rejected twice. Prime Minister May will join the E.U. leaders on 3-21-19 at a Brussels summit where she will ask the bloc to postpone Britain’s departure, warning a no-vote could lead to long delays.
Work started on Universal Alloys Corp.'s aerospace components factory in Da Nang. The U.S. $170E6 factory will be built at the Danang High-Tech Park and be the 1st-of its kind in Vietnam. It’s capable of assembly of 4,000 of 5.0E6-components of an aircraft with all parts to be exported. Export revenues are expected to be US$25E6 by 2021, US$85E6 by 2022, and US$180E6 by 2026.

U.S. Universal Alloy Corp., Anaheim, CA—manufacturer aircraft components funded S170E6 into a project producing fuselage components and engine elements to employ 3,200-high-skill workers for Boeing and Airbus. The Peoples Committee in Danang granted an operational license to 8-projects exceeding USD $469E6. Other projects worth 53.6E9 will be awarded over 13 times that of 2018, was announced by Nguyen Tien Quang, Director of the Vietnam Chamber of Commerce and Industry [VCCI]'s, Da Nang Chapter. Da Nang will also invest in high-tech agriculture, education, health care, and information technology.

More than 1.0E6-people turned out for “Put it to the People” march over the Brexit deal and an online petition calls for Brexit to be concealed, surged to 4.5E6 signatures in London.

8.1.2 Ports of Entry

1-Homeland Security Kirstjen Nielsen implored Congress to confront a “humanitarian catastrophe” on the southern border by supporting President Trump’s call for a wall and changing laws to crack down on asylum-seekers and illegal border-crossers. 2-The federal government has monitored a group of 59-journalists, attorney’s, advocates, and activists who interacted with a migrant caravan that arrived in Tijuana late last year.

President Trump will request another $8.6E9 in funding for more section of the border wall.

President Trump issued his first veto of his term by rejecting legislation to overturn his declaration of a national emergency.

A group of some 35-people including women and children mostly by the Pacific at Playas de Tijuana were detained by Border Patrol agents in Border Field State Park. In February 2019, 66E3-people were apprehended at the border. Overall apprehensions in FY2019 are some 268E3—up from 132E3 in 2018’s same period.

The U.S. will eliminate the 5-year tourist visa for Cubans, because the U.S. withdrew most non-essential diplomats staff from Havana in September 2018 and stopped issuing visas.
8.2 Culture

The number of people caught crossing illegally into the U.S. along the Southwest border in February 2018 was the most in the last decade at 66E3 that were apprehended by the Border Patrol, says the CB & P. In March 2009 it was 67E3.
Ref: The San Diego U-T 3-6-19 pp. A1 & A5

- A federal appeals court ruled on 3-7-19 that immigration authorities can no longer swiftly deport asylum seekers who failed an initial screening—opening the door for thousands of migrants a year to get another shot in federal courts to win asylum in the U.S. 2-More on government keeping a data-base on journalists, activists, and immigration. Attorneys during the 2018's investigation into last years migrant caravan civil rights groups seeking arguments against immigration authorities.

- U.S. District Judge Dana Sabraw ruled on 3-8-19 the class-action lawsuit over families at the border after July 1, 2017 that will entail thousands of additional children. Nearly all children separated from parents under the June 26 order have been reunited with their parents or what they wanted to do with them.

- The Supreme Court on 3-19-19 upheld the Trump Adm.'s. power to arrest and hold immigrants indefinitely if they had past crimes on their records that triggered deportations, even if they served their time years ago or were convicted of minor drug offences. The ruling in Nielsen v. Preap is based on an interpretation of a 1996 law.

- Criminal organizations in Mexico have a lucrative smuggling operation that uses express buses to deliver Guatemalan migrants families to the U.S border in a few days. They pay up to $7,000/adult with child. The U.S. is calling it the "Conveyor Belt" and asked Mexico to stop it.
Ref: The San Diego U-T 3-16-19 pp. A1 & A4

- Some 25-migrants were killed in a truck accident that overturned near the town of Francisco Sarabia in municipality of Soyalo in the far south of Mexico.
Ref: The San Diego U-T 3-9-19 pp. A3

- The U.S. Department of Homeland Security sent 240-migrants back to Mexico since January under an experimental new policy that requires Central American asylum seekers to wait outside U.S. territory while these asylum clearances are processed.

- Juan Sanchez, CEO of southwest key Programs stepped down over federal investigations of financial improprieties after 32-years. The charity's CFO Melody Chung left after a NYT article said there were mismanagement and malfeasance at the Charity. The shelter in Brownsville, TX known as Casa Padre was part of the Trump Adm.'s family separation policy, likening it to a warehouse for children, with millions of dollars in U.S. Federal grants at a nonprofit. Sanchez made $1.5E6/yr, his wife $500E3/yr, his daughter had a senior position, and Chung earned $10E6/yr. The operation is described as a shoeshine and golden gloves boxer turned Harvard doctorate and CEO. They had $61E6 and loaned money to real-estate developers.
Ref: The San Diego U-T 3-12-19 pp. A11
• A San Diego church that housed thousands of asylum seekers will be closed. Rev. Bill Jenkins, head of Christ Ministry Center because it was exceeding capacity, by order of the Fire Marshal.
Ref: The San Diego U-T 3-14-19 pp. B7

• A gunman opened fire on 2-Mosques in New Zealand on 3-15-19, killing some 27 or more people in the city of Christ Church. 3-men and one woman were in custody.—The massacre at 2-New Zealand mosques left 49-dead and 40-wounded at mosques in Christchurch by Brenton Harrison an Australian citizen.

• Tijuana ranked the most violent municipality in the world in 2018, where local gangs are fighting over a lucrative drug market with 138-killings/100E3 residents. Acapulco was 11/100E3; Caracas, Venezuela’s capital was 100/100E3; Ciudad Victoria, Mexico and Ciudad Juarez were the other 2 of 5 cities sited.

• 45-migrants died trying to cross the Mediterranean Sea to Spain. Morocco said 21-others were rescued at sea.

• The homeless can live in their cars 22-hrs/day but must vacate the spots between 2 and 4:00 a.m.in parking lots beside the sand dunes of Ocean Beach, Sunset Cliffs, Mission Beach, Pacific Beach, and La Jolla, as the city repealed an ordinance forbidding overnight stays in parked vehicles on the beaches. Residents do complain about misuse of the spaces.
Ref: The San Diego U-T 3-17-19 pp. A1 & A17

• A Turkish-born gunman killed 3-people and wounded 5 on a Tram ride on 3-18-19 in Utrecht, Netherlands— Population of 350E3.

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John G Wotzka 720 4th Ave San Diego, CA 92101, Ph: 619-446-7690, johnwotzka@gmail.com
Public comment for
Friday March 15
Sandag transportation committee

Start:
By a show of hands who of the board members uses public transit a minimum of three times a week?

I am here to report from the field.
I am a public transit user enthusiast.
I use public transit
day
Night
morning
weekends

My comments are designed to augment your own report:
/in the last 10 years your policies have achieved a 10% increase in transit use at the same time the population has grown 9.3%

Effectively the last 10 yr plan (TransNet) achieved flat line results.

Even if we were not ALSO facing a climate crisis,
That’s unsatisfactory to SD citizens.

This body’s transit decisions have converted a 15 minute car ride into a 1 hour transit ride....
Often requiring 3 connections—
With too many opportunities to miss trolley/bus connections.

I am here to ask the board to take bold action:
Reverse this ratio

Turn every 1 hour point to point transit ride into a 15 minutes transit solution
For every San Diegan

How? Focus on a point to point transit solution.

I offer 3 recommendations:
1 -high frequency lanes
2 -consistency
3 -last quarter mile
Point 1-high frequency lanes
No cars should ever access highway high frequency lanes- make this exclusively for bus and trolly use.
And
Create dedicated traffic lanes on local streets for uninterrupted bus/trolly traffic movement.

High frequency lanes prioritize public speed over private speed

Point 2-consistent service
All bus snd trolly service deserves to be 7 days a week/ 24 hours
With
10 minute frequency

People live their lives 24 hours.
Public transit point to point solutions need to address
Work/ play/ quality of life.

Point 3-the last quarter mile

Public Transit must penetrate neighborhoods
To make
Pick up /drop off
convenient to where people live.

The lasts quarter mile solution is modeled in Mexico City.
At the location of each trolly stop
And
Near each bus stop,
A network of
Bikes are offered for 45 minute free service
To penetrate the neighborhoods.

In Mexico City
This is called
Ecobici
(Website)
https://en.m.wikipedia.org/wiki/EcoBici_(Mexico_City)

A single transit card integrates
Bus
Trolly
Bike
With a mobile device app to tell you
Where bikes are located for pick up and return.

This ecobici point to point transit solution was built in
30 minute concentric circles of transit coverage
Which
won riders immediately, neighborhood by neighborhood
Ps
Ecobici was funded with a private/public partnership

In summary
Point to point transit solutions win ridership with
1-high frequency lanes
2-consistency
3 last 1/4 mile

The cost of inaction on this
point to point transit solution
can only be compared to the alternative cost of an
un-livable San Diego
Due to
Lost work time
Lost quality of life
Not to mention the elephant in the room:
Devastation of our planet

San Diego deserves to be a
World class smart city

End
/////

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Dear Ms. Lero

I heard a recent radio program that mentioned that at your upcoming April 4, 2019 meeting that there may be some consideration of your new director’s views on focusing SANDAG’s efforts on mass transit rather than road building. In this light I have some ideas I would like to share either at the meeting or in another way and wonder what would be the best way to communicate my views. Please advise.

While living in the Truckee / Lake Tahoe Region I developed a rather detailed plan about using a system of high speed aerial gondolas to tie together the region’s many small towns and major resorts. This is an area in which are no large scale opportunities for building new or expanding the existing road system. There are currently several major initiatives of this sort, including a large system planned for Mexico City (see www.gondolaproject.com).

My views for this type of system in San Diego would be its potential utility as a means of providing a means of connecting the many unserved localities to the existing trolley system by running lines from the mesa areas (North Park, City Heights, Kensington, etc. on the South) and the North Rim of Mission Valley (Kearny Mesa, Linda Vista, Del Cerro, etc.) to the trolley by running lines down some of our canyons. The attached Truckee Tahoe Proposal shows some of the research work I have done to look into costs per mile, rider volumes, energy efficiencies, etc. Some of this work could be used as a framework to update the document and map out lines that would connect the many underserved communities with a system with far lower costs per mile than elevated tracks, tunnels, etc.).

Cheers,

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“A Subway in the Sky”

A Proposal for an Aerial Tramway Based Regional Public Transportation Network

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Submitted by:
The Tahoe Regional Alternative Transit Council

Date: 4/4/2011
Concept art by Ron Gaunt of Gaunt Zimmer Designs

Date: 4/4/2011
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</tr>
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Some Notes to Readers

This document is a discussion of the Tahoe Truckee Region’s need for a modern public transportation system to supplement the current surface-based system followed by a proposal for the type of system needed to create an integrated, area-wide transit solution.

The initial proposal is being created by Jeff Sparksworthy, a local advocate for alternative transportation, who foresees the creation of a system that bypasses the need to create and maintain more roads that service cars that burn ever decreasing reserves of fossil fuel. The writer has no direct personal gain-based motivation for creating this proposal. The goal rather is to help start and push forward the discussion about long-range regional transportation needs and ways to meet them, and hopefully to start the process of turning the proposed concept into a reality.

In my view of the future, we are as a society acting rather like the proverbial frog sitting in the water as it comes to a boil. For over thirty years, we have known that our behaviors in terms of energy use and pollution emissions are both economically and environmentally unsustainable. Even though the prospect of global warming has become grudgingly accepted by some (if not all), we still send our national treasure and now our best and brightest young people into harm’s way to keep the oil flowing. We should have been focused on national and local solutions decades ago. Now according to climate scientists, we face these problems with a new urgency. Even if more oil reserve were suddenly available, we should lower our carbon emissions anyway. We use about 30% of the oil imported for transportation. Increasing vehicle fuel efficiencies does not solve the problem, it only allows us to have more cars and continue our destructive patterns until all we have is “frog soup.” Spending scarce resources on any further developments and improvements to our existing street and highway systems is, in a sense, spending money we do not have to perpetuate a system that is failing us.

The Need for Alternative Regional Transit

The greater Truckee / North Tahoe Area is the economic and social center of the region. Offering adequate and environmentally friendly access to the region’s many recreational, employment, and educational opportunities is vital to the long term health of the region.

To protect and preserve the beauty of Lake Tahoe, the entire region needs a comprehensive alternative transit system. Cars and their emissions and road salt and debris constitute a threat to lake clarity and require extensive mitigation and, in the long run, are not economically or environmentally sustainable.

Currently, the area is served by the airport, Amtrak, and Greyhound for long haul service and for short haul there are: a bus system (TART), a series of small private shuttles, a dial-a-ride service, some taxi services, and some transportation provided by local ski areas. There is no integrated approach to get people to or from the train station, the airport, the ski resorts or other recreation sites.

The basis of these projections for needing other forms of transit are: an increase in population (both resident and visitors), higher vehicle fuel costs, higher road building land, labor, and materials costs, the ever-increasing costs of personal vehicle ownership (cars, insurance, and health from increased pollution). Also a factor is the possible damage to the environmental health of the region if we keep building and salting roads and losing habitat.

In the long term, the area’s future transportation needs for both the important tourist sector and for the local service sector employees cannot be realistically met using current surface modes of transportation (cars and buses) for several reasons:

- Meeting the needs of future population increases would require expensive and potentially impractical road lane increases. Right of way acquisition costs, construction costs, and on-going maintenance and
snow removal costs may not be adequately funded by federal, state, and local sources to achieve the transportation needs of the area.

- Strict Lake Tahoe watershed and air quality standards drive the need to either mitigate the impact of car-related pollution sources or to replace surface transportation where possible with lower impact alternatives.

**A Mental Exercise to Prove the Need for Transit Alternatives**

Others may have their own ideas on how to solve the transportation dilemma; some may even insist that we can continue to use cars and gasoline into the indefinite future – regardless of social, environmental, and economic factors. In this regard I ask the reader to perform a mental exercise as described below.

Imagine that the problems being addressed in this proposal can be seen as wheels in a combination lock or a slot machine. On each “wheel” is a series of numbers or ratings representing the probability of that wheel’s problem being more or less severe. You can develop your own set of “wheels” and your own solution based on your set of factors. This is my set of “wheels:”

- One “wheel” is the future “retail” cost of fuel (optionally including or excluding that portion of the national defense budget related to protecting oil production and delivery). This is a large, but hard to quantify figure (but it will almost certainly trend upwards in a spiral as scarcity drives up the price). 30% of the fossil fuel burnt for energy in America is used for transportation. Unless large deposits of easily accessible oil are discovered on American soil, the future of fossil fuel-based personal transportation is likely to be a short ride.

- Another “wheel” is the cost to build and maintain more roads for future population growth. In some case this approach is spending some of the last of the oil and infrastructure dollars on a system that we really need to supplement with alternatives sooner rather than later.

- Another “wheel” is the need to provide transportation to our region’s locals, visitors, our working poor, and our youth under driving age.

- Another “wheel” is whether enough people will be able to afford a new electric or hybrid car. Usually these new technologies are at first economically out of reach of many people. Also, these new technologies require the evolving of their own charging or fueling station networks.

- Another “wheel” is the access to rights of way to build new roads – complicated by our mountainous terrain which limits practical routes.

- Another “wheel” is the need to lower the state’s “carbon footprint” by developing modes of transportation that do not require 100-200 horsepower vehicles to move 1-4 people 10-20 miles (at a mile a minute) between workplaces, resorts, and lodging.

- Another “wheel” related to the hidden costs of the current transportation system are the human injuries and medical and legal costs stemming from accidents. Factoring in the potential to reduce these costs and to reduce drunk driving incidents weights this wheel’s importance.

Finally, imagine the last “wheel” which represents the likelihood of developing soon an entire new, more efficient energy and transportation infrastructure before we run out of affordable oil. Obviously the solutions proposed herein are not the only viable solutions to the need for an area-wide transportation solution. It may be that these solutions are not the most practical or cost effective, but any solution agreed to and acted upon needs to meet some or most of the criteria outlined in the section “The Need for Alternative Mass Transit.”

These proposed solutions will not be built in the next 3-5 years, but the need for them will not go away. Many climate scientists are saying that we need to start now to begin mitigating the effects of climate change. Unless we start soon to address these long-term issues, the “long term” will be upon us.
When We Reach The Oil Cost Tipping Point

The projected eventual rise in the cost and the lower availability of gasoline will compound the road expansion and maintenance problems due to the lower revenues from gas taxes.

Development and construction of the system may take decades. The points at which the funding and political and social willpower to make the needed transit infra-structure changes will be “tipped” or driven by fuel costs (and availability), carbon costs or “soot taxes,” etc. A part of the initial project studies needed will be to determine if some of proposed transit system’s energy sources could be developed and distributed regionally – instead of relying on oil-based imports. Another and perhaps most critical factor determining the projects’ success is whether the new components of this multi-modal system could be based on business models that show the potential profits to be made from have a system in place before oil prices limit our options even more. An obstacle to looking at this potential profit picture is the long list of artificial subsidies we pay as individuals and as a society to make automobiles SEEM affordable. If our mindsets were such that the nation’s automobile-related road maintenance and medical expenses and the costs of continued military presence in the Persian Gulf were counted in the price at the pump – we would see the true cost of cheap gas.

The embedded Excel spreadsheet attempts to “even the playing field” by identifying the true combined costs of the various modes of personal transportation we currently use (with a series of gas price increases as economic tipping points) to determine at what point various transit modes become or cease to be economically viable. The table is a work in progress, but when completed it may show that some transit modes that are marginally cost effective now may become unaffordable soon and conversely – some transit forms that are now too expensive – make become more “affordable” – especially in the long run.

Google DOCS Link to Spreadsheet.

We Could Have “Been There” By Now

We’ve known we needed energy efficient mass transit for a long time. We had our first “oil crises” over 35 years ago. We should have viable alternatives by now. The German town of Wuppertal has had its Schwebebahn for over 100 years.

In 1919 future President Eisenhower led a grueling 62-day long, 3,250-mile “First Transcontinental Motor Train” from Frederick, Maryland to San Francisco, California. He later led the creation of the current Interstate Highway System. This was an effort to emulate the German autobahn, (built as a defense measure) which also resulted in making our current car-centric travel modes possible -- at a cost. Much of this original cost was underwritten in the defense budget as a means of quick troop movements and even emergency landing strips.

This cost is now measured in the nation’s initial and ongoing investments in construction and maintenance, the fuel costs, the environmental costs, and the human cost in terms of injuries and deaths. Until now, most of these costs were assumed to be bearable and sustainable – an assumption that is perhaps rife with peril.

Figure 1 - The Wupperltailler Schwebebahn
Doing Nothing Is Not an Option

According to the California State Energy Commission over 40% of all energy used in the state moves people and goods. Almost all of this transportation energy demand is met by petroleum usage. California’s nearly 26 million registered vehicles consume approximately 480 million barrels annually (16 billion gallons of gasoline and 4 billion gallons of diesel). This makes the state the third-largest consumer of transportation fuels in the world behind the United States as a whole and China. This consumption costs the state's economy and environment. In California 45% of the state's crude oil and 10% of its refined fuel are imported. The state is heavily dependent on foreign supplies. Furthermore, California’s transportation sector is the single largest contributor of greenhouse gas (GHG) emissions, producing nearly 39% of the state's total carbon emissions.

The TRUE costs of doing nothing will be that we leave our children and grandchildren strapped to an expensive, destructive, and unsupportable personal car-based transit system with no clear alternatives to replace it with in the foreseeable future.

The assumptions of the need for and the practicality of this type of system are based on the following factors. One key assumption that needs to be “stress-tested” – is that whether or not this type of system would have a lower impact than the equivalent car passenger load in terms of land use, habitat destruction and migration interference, fuel consumption, carbon and other emissions, and material deposits (tire bits, engine oil, glass, etc.). Another assumption is that the local working people and school commuters would use the system regularly (instead of their cars) and that visitors would use the system in substantial numbers.

You might disagree with this proposal, for example:

- If you think that current fossil fuel based transportation systems will last 30-50 years (until those fuel cell based “concept cars” get into production). The current car based system services 1.5 individuals per car on surface streets. I, for one, do not assume that personal gas/diesel powered surface transport will last for more than 20-30 years in terms of costs and climate impacts. The remaining “affordable” liquid fuels should be reserved for agriculture and heavy commercial trucking needs and to buy the time to create alternatives for personal and mass transit.

- If you think our local population and visitor base will not grow but will stay the same or decline in numbers, you might think there is no need.

There are financial and topographic challenges in this region to finding practical new surface routes in some major transportation corridors (to Glenshire Dr., Hwy. 89 South, or Tahoe Donner, for example). Even if the rights of way for these routes could be obtained, the continued maintenance and snow removal costs make creating more roads an extension of the problem rather than a solution.
System Requirements

When looking at the design and implementation of any system, the first step is to define the actual operating requirements of the system – stripping away any preconceived notions including the design of legacy existing systems. In this proposal, the requirements are to move people and their packages or gear from a variety of locations to a set of destinations.

The movement of people and their things does not in fact require roads and cars. If the requirement is to lower dependence on foreign oil and to reduce pollution and greenhouse gases, then roads and cars are actually precluded from the design because they do not meet these criteria.

The area’s mountainous geography, large weekend & holiday tourist influx, and the dispersed nature of our civic, commercial, and recreational centers drive the basic requirements of any mass transit system.

Any practical regional transportation system must meet the following requirements. The system must:

- Accommodate increases in both resident and visitor populations.
- Provide safe, reliable, and timely access to personal transportation.
- Help avoid the ever-increasing costs of vehicle ownership (car costs, insurance, and health care from accidents and pollution).
- Reduce the need for more road building with ever higher land and right of way acquisition costs and reduce maintenance and snow removal costs.
- Avoid environmental damage to the region resulting from continued road building and habitat and migration corridor loss.
- Maintain strict Lake Tahoe and Truckee river watershed quality standards.
- Help forestall the projected rise in cost and lower availability of gasoline.

The system envisioned attempts to solve several key transportation related issues.

- It must be environmentally sound and not require large land or energy use or have erosion impacts.
- It must be cost-feasible to build and run in terms of right of way costs, construction costs, and operating costs.
- It must be attractive in terms of price and convenience to draw riders away from their cars.
- It must be available 24/7 (or at least 18/7) with minimum staffing costs while it must also meet the needs of resident and vacation riders to reach their destinations in a reasonable timeframe.
- It must have excellent, comprehensive rider services such as fool-proof baggage handling, valet and sky cap services, rental lockers, and even tour guides or trip escorts for young riders.
What Works and What Doesn’t

In light of the system requirements the next sections will explore transit systems that may be applicable to our region and eliminate some system types that are precluded.

The following sections briefly discuss the pros and cons of the various types of existing transit modes. Some of these types of systems show promise for solving some part of our regional transit needs. However, some of these transit modes have one or more aspects that may limit their potential application in our regional transit mix.

Some Systems that May Work

To determine the best and most region-appropriate mix of transit solutions, broad ranging transportation viability studies will be conducted by the Tahoe Regional Alternative Transit Council. These studies will be conducted based on the premise that we only get one chance to do it right.

The initial studies will focus on the applicability of several off-the-shelf technologies and how those could be knit into a comprehensive regional transit solution. The system includes:

- Aerial Tramways and Gondola Systems – Fixed Grip and Detachable Gondola Systems -
- Fixed Rail Systems – Increased Sacramento to Reno Passenger Service Connections and Potential Regional Light Rail Segments – To get international and long distance national tourists in and out of the Lake Tahoe Region we need more regular passenger rail service between Reno and Sacramento - the two adjacent major metropolitan centers with airports and highway connections. “Snow Trains” and other “specials” should be able to have 2 to 4 times a day access to the region’s rail links.
- Commercial and Private Aviation – Reno, Truckee, and South Tahoe Airports and Amphibious Options – The Reno Airport is the major local commercial aviation hub and it has international service capability. Depending on seasonal weather conditions, the Truckee Airport services a relatively high volume of small jets and personal prop-driven aircraft passengers (especially on weekends). The South Lake Tahoe Airport fills the commercial and private aviation needs of that community. Marine Operations – On-demand Water Taxis, Scheduled Shoreline and High Speed Cross Lake Ferry Service -
- Last Mile Segments – Shuttle Buses, Pedestrian & Cycle Paths, Drop Offs, Rental Cars -
- Existing Surface Modes – Cars, Buses, Recreational Vehicles, Commercial Trucks -

Of course for any of these new or alternative modes to be considered a worthy replacement for the current, automobile-based infrastructure, the mode(s) will have to be more energy efficient per passenger mile and have lower negative construction and maintenance environmental impacts than do cars and highways. The long term costs/benefits picture must include the energy, material, and environmental costs of the construction of any alternative infrastructure.

Any alternative regional transit infrastructure that will compete for customers, capital financing, (and possibly tax dollars) with the existing street-and-vehicle based systems must address some critical issues. These include:

- “Build-ability” – It must be a proven concept in terms of construction costs, the populations served as a revenue base (and the costs to those displaced by the new system), and other limits - such as terrain.
- Economic viability in terms of attractive long term solid returns on initial construction investments and a revenue positive (or at least a revenue neutral) outlook on the operating costs. Some system business models would base some of the operator profits and initial capital returns on vendor leases, advertising revenues, parking, and other sources.
• Measureable environmental mitigations (or even emission reduction-based gains) based on regional vehicle miles reduced, carbon offsets, or some other quantifiable rating.

• Convenient in terms of making it so that a substantial portion of the area’s tens of thousands of weekend tourists and a significant segment of our local skiers and work force would use all or part of the alternative systems being proposed.

Details on these potentially applicable systems will follow the next section on systems that are precluded from consideration.

Some Systems that Don’t Work

In many ways, we are in the “Thrall of Our Freedom of Movement.” Our ability to travel to almost any surface destination at any time we choose seems like freedom, but this luxury comes at quite steep costs in terms of gas costs, air and water pollution, global warming, accidental injuries and deaths, and our national security.

In our mountainous and snow covered region surface-based transportation has several disadvantages:

• Practical routes are limited by hills, rivers, and land ownership. Even if we had the funds to create and maintain more roads, the terrain limits the choice of routes.

• Rights of Way are hard to obtain.

• Animal migration paths are impacted.

• Snow removal is a large and on-going cost component.

• Road salt and sanding degrades the environment and requires cleanup.

• A single wreck or spin out on icy roads ties up the entire transportation corridor.

• Even the rail systems in the region rely on snow sheds to protect the tracks in winter.

Figure 3 - Donner Lake and Railroad Snow Sheds

According to an estimate from a local paving industry, a 24-foot wide paved road costs between $8.00 and $10.00 per square foot (cleared and prepped, graded and paved - not including land and right of way acquisition costs). This translates, for example, into a $5 million dollar per mile new Glenshire Dr. and a $10 million dollar per mile road to Tahoe Donner. Add in the land costs and future asphalt materials and labor increases and these roads cost far too much to build – even when we need them.

In our region there are additional on-going costs to maintain, plow, and recondition or replace the road surface frequently due to weather and tire chain caused damage. Also, there will always be an imbalance in the constant needs of locals who use I80 every day and shrinking state and federal road maintenance budgets and schedules. This may double or triple the actual costs of the roads compared to milder areas.
Personal Vehicle Usage Costs

The total cost of ownership for personal automobiles is hard to quantify, but several considerations must be taken into account. According to a 2009 study conducted by the AAA, the total per mile costs of automobile ownership is a combination of fuel costs, tires, maintenance, taxes, depreciation, and other factors.

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Cost Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Sedan</td>
<td>$6312.00</td>
</tr>
<tr>
<td>Medium Sedan</td>
<td>$8,104.00</td>
</tr>
<tr>
<td>Large Sedan</td>
<td>$9,870.00</td>
</tr>
<tr>
<td>SUV</td>
<td>$10,200</td>
</tr>
<tr>
<td>Minivan</td>
<td>$8,815.00</td>
</tr>
</tbody>
</table>

According to the AAA factors my personal “subsidy” of the auto and oil industries over the past 20 years has amounted to over $250,000 when I add all the cars purchased and the oil, repairs, tires, insurance, etc. (not including taxes related to oil field defense). In addition to the personal costs of maintaining the status quo – (if that were even possible), there are social, political, and environmental costs or effects that impact us now and our children in the future.

- At some point -- with ever increasing oil and environmental costs -- only the financially advantaged will be able to afford personal car ownership. With no personal or mass transit systems in place, many areas will not be able to sustain their suburban, personal car-based systems for work, school, and shopping.
- The continued environmental damage caused by spending up to 1/3 of our energy on personal transit – now deemed “acceptable” – will be unsustainable in an era of limited personal and governmental budgets.
- 2004 University of Alaska study estimated that the U.S. could save between $27 to $73 billion dollars a year by eliminating its Persian Gulf commitments (of which roughly $6–$25 billion annually – or $0.03–$0.15 per gallon is attributable to motor-vehicle use). It was recently reported on NBC Nightly News that the costs of Persian Gulf military operations have exceeded the value of the oil being imported from the region.

When you combine these factors, car-based transportation may not even be affordable now, let alone in the long term.
**Bus System Limitations**

Although a bus system will be part of any matrix of transit solutions, a bus system won’t fill our long-term, short-haul transportation needs. One reason is that our area has very high peak "episodic" visitation rates due to holiday timing, snow storms and skiing visitors, and special events. The opening and closing hours of the ski lifts also clogs the bus system. Adding buses just relies on the same jammed road systems and their scheduling is susceptible to traffic delays. Reliance on a bus system also has limitations and problems. Upcoming state and federal mandates on diesel particle emissions may require bus based transit systems to replace or retrofit their entire fleets. Some of this huge cost could be avoided using non-surface modes of transit and replacing less of the older equipment – using fleet attrition to meet the mandates.

- Operating costs and low ridership often force schedule and destination limits.
- Buses run on their schedule and make riders wait in the cold – often to be late for work.
- Buses are subject to delays if roads are blocked by traffic accidents.
- Buses are a source of pollution from engine exhaust, tire wear, and oil leaks.
- Surface-based transit still requires snow removal.
- Rigid bus scheduling limits personal travel flexibility.
- Bus driver labor costs would be an expensive cost to bear (especially if late night runs were added).

**Light Rail System Limitations**

In some parts of the region light rail may have applications where, for example, a right of way is available and the distance travelled is too far for an aerial tramway to cover at 20 MPH. Even though light rail is the “poster child” for future urban transportation, in most cases it is not really a viable solution for our region due to the points listed below:

- High construction and operating costs preclude this type of system as a solution in all but high density urban centers. If building, maintaining, and snow plowing, more roads is impractical - then creating a nearly level road bed with 100’ s of crossing points at a cost of $50 million dollars a mile make this an option that is not practical in our sparsely populated area.
- These system’s high operating costs make them an almost guaranteed money loser.
- Surface light rail also requires a special infrastructure with expensive and often custom rolling stock, an expensive right of way, snow and ice removal, and an expensive labor force.
- Light rail also has an inflexible timetable and limited accommodation for gear (such as skis and bikes) and baggage.

**The Impracticality of Subsurface Subway System**

A true “below grade” subway system would not be appropriate in our area.

- Construction costs can be upwards of $150 Million Dollars per Mile! Tunneling costs would be astronomical in our rocky and unstable terrain.
- Subways run on their schedule – not yours.
- Labor costs are very high and subways require expensive rolling stock.
Regionally Applicable Transit Systems

Fixed Rail Systems

In areas where relatively level rights of way are available, fixed rail systems may have applications. The LEITNER MiniMetro® offers outstanding flexibility for integration within the urban infrastructure.

The compact design of the cars means a minimum footprint for the system as a whole and optimum harmony with existing buildings and structures. The APM technology also handles demanding routing requirements, with such features as a 12% hill-climbing capability, and the availability of overhead guideways or underground sections.

They rail-based systems may be too expensive per mile to deploy throughout the region, but they may have applications. These systems may run in Truckee on the commercial corridor or to Tahoe Donner or possibly along Hwy 28 in North Tahoe in short segments to serve points of interest or tie together commercial and residential areas.

The Commercial and Private Aviation Sectors

Current Regional Aviation Services

By the very nature of air travel, non-resident passengers (those who don’t have their own cars parked at airports) who are debarking from flights need public, rented, or alternative transit. Often, this type of passenger’s post-flight transit options will be limited to bus service or rental car service.

For transit interties to work well between local airports and the commercial and recreational and residential areas in the region, there needs to be more travel alternatives that offer regular last mile services. Any complete system needs a combination of regularly scheduled and “dial-a-ride” type shuttle services that service the airports. Also, vendors would offer rental bikes and electric mopeds, taxi and curb-side car drop off services, etc.

The current set of area airports, even with their limited interties, do indeed service the needs of tens of thousands of air passengers. Each of these visitors brings a vital economic influx to the region. Any improvements in air travel and its last mile transit component can only enhance the region’s economic vitality and reduce road usage.
The Future of General Aviation

To relieve urban congestion NASA and other government and commercial entities are re-exploring the role that private aviation could have in alleviating traffic (especially as short- or vertical-takeoff models are developed – such as the Puffin concept – shown below).

![Figure 5 - NASA Puffin VTOL Aircraft Concept](image)

The NASA CAFÉ Standards as defined in their “Green Flight Challenge” are the current guidelines for increasing fuel efficiencies and other improvements to general aviation. The $1.65M purse for the challenge will require competing aircraft to make improvements in fuel efficiency while meeting strict safety and low noise guidelines. The goal will be to exceed 200 passenger miles per gallon. The entries are expected to include gas and diesel powered and hybrid and electric powered aircraft. These developments could revolutionize personal air travel.

[NASA Green Flight Challenge](link)

Marine Transit Systems

Due to the fact that almost the entire shoreline of Lake Tahoe is a destination or point of interest, it makes sense to consider the lake surface itself as a transit corridor. As long as the transit population served is sufficient to support the costs and the environmental effects are manageable, then conceivably thousands of visitors and home-owners could avail themselves of lake taxi or ferry service.

![Image](image)

The development of a ferry system on Lake Tahoe is a long range goal that will require careful environmental consideration and that will have high regulatory requirements due to the interstate waterway aspect of operations. Only a relatively consistent high rider demand would justify the system’s expense, but if the roads around Lake Tahoe became toll roads to reduce traffic, for example, waterborne transit would become an ideal way to see the lake.
The ferry system would initially be a fleet of 20 passenger craft that would serve the communities along the northern and western shores of Lake Take and tie into the other transit hubs. Eventually, car ferries may be added to the system, but their deeper draft would require longer piers and more environmental protections.

Any system would require the construction of deep water piers, passenger terminals, and parking structures. Area government land use and planning documents and TRPA and U.S. Coast Guard guidelines would govern the construction projects and the operational aspects of the ferry service.

**The All Important Last Mile Systems**

Of course the major obstacle to the introduction of any new infrastructure system is “the last mile.” This seems true for this system as well. The highly “branched” and “looped” nature of our neighborhoods will force us to rely on surface transportation (cars and buses) to reach the stations of this aerial tram system. For the system to be fully successful in reducing the overall carbon footprint and traffic parking problems associated with 1.5 per person trip car travel, there must be an expanded neighborhood based dial-a-ride van/bus system with express delivery to the tram stations. Or there must be affordable short range zero emissions vehicles for that last mile.

In our snowy region, even personal automobiles have a “last mile” problem. Although that “last mile” may well be only a 3 foot deep berm of snow on 50 foot of snow packed driveway, we all still spend hours of time and/or hundreds or dollars a year on snow removal contracts to allow us to drive that first and last bit of the trip to the garage.

In the case of public transit, the “last mile” is really the key to success or failure. Success will depend on making it easy enough to get you, your children, and your groceries to and from the nearest transit station to your home, work, or recreation destination.

**Figure 6 - Local Bus Service**

America’s suburban Diaspora, which is more spread out by mountains in our region, magnifies the last mile issues. No one wants to walk very far on narrow, icy streets (especially with groceries or gear). Therefore, the range of “last mile” options must be comprehensive. The system must offer scheduled neighborhood shuttle service, on-demand service like taxi or dial-a-ride, bike or even smart car short term rentals, and even valet delivery for packages and gear. Easy to use passenger pick up and drop off zones for cars and buses will be part of the planning which will separate vehicle and pedestrian approaches. Bike racks and long term lockers and other aids to cycling or walking will be part of the station and system design.

For the system to succeed it will be essential to blend all regional modes of transportation into the gondola way-stations and terminals. Buses, Amtrak, private plane owners, cabs, pedestrian, bike, and ski traffic must all be accommodated.
The Evolution of an Alternative Infrastructure

An infrastructure and the transit systems needed to supplement and partially replace current auto and surface-street based will not appear overnight. The cost and complexity of such an infrastructure make a staged development the only realistic path.

No one type of transport is going to replace the current fleet of trucks and cars entirely, so a mix of solutions needs to be implemented to even replace an appreciable portion of the current surface traffic. Any alternative systems must compete in terms of cost, positive rider travel experience and gear/baggage handling convenience - while at the same time reducing carbon footprint and environmental degradation associated with transportation.

The region will ultimately need to be served by a mix of transit modes including commercial and private aircraft, cars, trucks, and buses, trains, ferries, and aerial tramways. All of these transit modes must integrate with bike lanes and pedestrian paths and neighborhood shuttles to address the “last mile” issues.

The map to the right shows a complete mix of inter-modal transit solutions. The map shows airports, ferry routes, aerial tram routes, and shuttle bus lines and how the systems converge at key interchanges.

Figure 7 - Intermodal Transit Map

Each of these transit modes could be developed and built on an as-needed basis depending on the economic viability of the individual routes and service areas. In light of this “evolution” any long range planning should acknowledge the need to accommodate the future development of the other links in the complete inter-modal system.

Initially, the system would be developed around a core of the most profitable routes and services (those with high average and peak ridership numbers). These same routes would also offer the greatest environmental and social benefits. For example, one scenario is to start by having a single main line from Truckee to Tahoe City that serves a transfer station at the bottom of the “back side” of Northstar. This station would have lines that connected to Squaw Valley and Alpine Meadows Ski Areas. Another spur could run from Truckee to the “front” of Northstar.
This branching pattern of short lines could take thousands of cars off of both Highway 89 and Highway 267 and save thousands of wasted commuter hours while reducing pollution.

In this configuration skiers could buy a “multi-pass” and ski at any of three resorts without needing to drive. The distance between Alpine Meadows and Northstar (near Truckee) is 15.5 miles, but on heavy traffic weekends, this trip can take hours on the single two lane route.

**Figure 8 - The North Tahoe Resorts Routes**

There are several advantages to this initial layout:

- One advantage is that it could be completely within a single governmental jurisdiction (Placer County) – simplifying the permitting and regulatory processes and costs.

- In addition, each of the three major resorts served would have a financial incentive to support the project directly or indirectly through the granting of easements and by cooperating with project planning.

- This route serves some the Truckee Regional Park and the Truckee Airport as well.

- A centrally located parking garage (perhaps near the Truckee Airport) could serve the entire system’s northern terminus.

- The resorts serviced by the systems offer the most non-ticket related revenue streams from sources such as vendor stall rentals (ski rentals, news stands, etc.), to gear locker fees, to food court sales, to advertising, and parking and valet fees.

- An existing U.S. Forest Service road could serve as the Truckee to Tahoe City tram route’s construction and service access route.

Once this network of high volume routes were running and generating profits – other lines would be added to service more areas of Truckee and Lake Tahoe’s North Shore (using some of the revenues re-invested and having the potential new service area’s users “subscribe” to the system to share costs – like a town joining BART’s system). In this way, as rider demand manifests itself, Glenshire, Tahoe Donner, Donner Lake, and even the many resorts at Donner Summit could join the system.
Using Transitional Technologies

Most of us have been hearing for almost three decades about the advent of “clean fusion,” “the hydrogen economy,” “clean coal,” “safe clean nuclear,” “clean, cheap solar,” and other promised replacements for the current fossil fuel-based modes of power generation and transportation. If we wait for these technologies to mature, it will be too little and too late in terms of reducing the costs and impacts of using the present transportation systems.

It is vital to start doing something NOW, using existing, proven technologies that could be retrofitted to use different truly “clean” power sources as they are developed and come on line. This simple mechanical system could use electricity from any source and does not rely on a series of new filling or charging stations to work. The figure at the right of future fuel prices is from Wired Magazine, March 2009.

After all, even if we wanted to, how long can we afford to continue to buy the oil, the asphalt, and the cars, (and to bear the injury-related health costs, and to pay the carbon offsets, etc.) that we would need to carry each of us in our own vehicle?

Figure 9 - "Wired Magazine's" Gas Station of the Future

Any shift in the way we do things is typically locked in a “chicken and egg” cycle. Private industry cannot take the risk of inventing and distributing new travel-mode products unless there is a large social and governmental “buy-in.” In order for the past model to work, the people in large numbers had to buy cars, gasoline suppliers and repair shops had to rapidly develop infrastructures to support these vehicles, and government agencies had to develop and cooperate to implement and enforce safety rules. Unless someone makes the first step soon and starts to develop a supplemental or replacement transportation network, there may not be enough time to implement any types of new systems before oil production is well past its peak and fuel costs have soared again.
According to Joanne Marchetta, the Director of the Lake Tahoe Regional Planning Agency (TRPA), a key focus of the organization’s efforts will be to deal with the effects of traffic on the basin’s environmental health. TRPA is already participating with the Nevada Department of Transportation and other agencies on bike path and “walk-ability” projects.

“With approximately three million visitors coming to Lake Tahoe per year, most still by car, transportation choices can meaningfully influence our environment and quality-of-life. Many of our visitors arrive from the Bay Area, where drivers waste nearly 60 hours per year in congestion, according to a national 2009 Urban Mobility Report. While our traffic backups here in Tahoe are generally confined to peak holiday weekends, long lines of vehicles on clogged roadways are not what we should accept for Lake Tahoe.

The Bi-State Compact creating TRPA mandates that we reduce our dependence on the private automobile. This mandate is an extraordinarily high bar to reach and can be achieved only through partnerships, perseverance and public support. And building partnerships and public support are TRPA’s two new focus areas for delivering environmental gain on the ground at Lake Tahoe. The delivery of critical transportation infrastructure projects will create a foundation to help rebuild our economy and reinvigorate our communities all while protecting Lake Tahoe.”

Visit [Tahoe Regional Planning Agency](http://www.trpa.org) for more information.

The following table taken from the US Transportation Energy Data Book states the following figures for passenger transportation energy use in 2006. These figures show that the only modern hybrid and vanpool offer any significant energy efficiency gains (due to higher propulsion efficiency on one hand and higher rider density on the other).

<table>
<thead>
<tr>
<th>Transport Mode</th>
<th>Average Passengers Per Vehicle</th>
<th>Btu Per Passenger-Mile</th>
<th>Mj Per Passenger-Kilometer</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanpool</td>
<td>6.1</td>
<td>1,322</td>
<td>0.867</td>
<td>Most efficient auto-based system – Use Same Roads</td>
</tr>
<tr>
<td>Efficient Hybrid</td>
<td>1.57</td>
<td>1,659</td>
<td>1.088</td>
<td>Toyota Prius - Use Same Roads</td>
</tr>
<tr>
<td>Motorcycles</td>
<td>1.2</td>
<td>1,855</td>
<td>1.216</td>
<td>Use Same Roads</td>
</tr>
<tr>
<td>Rail (Intercity Amtrak)</td>
<td>20.5</td>
<td>2,650</td>
<td>1.737</td>
<td>No Tahoe Service</td>
</tr>
<tr>
<td>Rail (Transit Light &amp; Heavy)</td>
<td>22.5</td>
<td>2,784</td>
<td>1.825</td>
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<tr>
<td>Rail (Commuter)</td>
<td>31.3</td>
<td>2,996</td>
<td>1.964</td>
<td>No Tahoe Service</td>
</tr>
<tr>
<td>Air</td>
<td>96.2</td>
<td>3,261</td>
<td>2.138</td>
<td>Small Jets Only</td>
</tr>
<tr>
<td>Cars</td>
<td>1.57</td>
<td>3,512</td>
<td>2.302</td>
<td>Use Same Roads</td>
</tr>
<tr>
<td>Personal Trucks</td>
<td>1.72</td>
<td>3,944</td>
<td>2.586</td>
<td>Use Same Roads</td>
</tr>
<tr>
<td>Buses (Transit)</td>
<td>8.8</td>
<td>4,235</td>
<td>2.776</td>
<td>Use Same Roads</td>
</tr>
<tr>
<td>Aerial Tramway</td>
<td>4</td>
<td>500</td>
<td>0.263763963</td>
<td>Dramatic Efficiency Gains – even at ½ capacity – if all 8 passenger gondolas were full – 250 BTU PPM.</td>
</tr>
</tbody>
</table>

Table 1 - Energy Used Per Passenger Mile
**Will the Future Get Here In Time?**

Future modes of transportation, such as electric vehicles or hydrogen powered vehicles do not yet exist for commercial purposes and do nothing to solve our problems in the near term. Also, we would need to re-wire our local grid to accommodate the charging stations.

Improved surface vehicles – regardless of their fuel source - all still require scarce roadway capacity and the snow removal, parking, and increased road maintenance associated with their use.

Also, the region’s low temperatures also would be problematic for an electric vehicle’s batteries. The lower ground clearance associated with high efficiency vehicles is also a problem on our area’s snowy roads.

Fusion power, wind power, photovoltaic cells, “clean coal”, hydrogen fuels, and other technologies may eventually become part of the solution, but we might not have these advances on line for decades.

**The System Centerpiece – A Proposed Aerial Tramway: “A Subway in the Sky”**

![Concept art by Ron Gaunt of Gaunt Zimmer Designs](image)

The solution advocated in this proposal is to create a region-wide transportation system using high-speed, 3-cable detachable aerial tramway gondolas. This gondola system will be the centerpiece of the inter-modal infrastructure which will consist of a branching series of 3-wire aerial gondola lines that service the key resorts, towns, points of interest, and other transit hubs.
The system would, for the most part, use “off-the-shelf” technologies to avoid costly development efforts. The tramway system would use 6-8 passenger gondolas to transport people (and their baggage and sports gear) between the region’s residential neighborhoods, commercial districts, schools, and resorts and recreation facilities. A series of stations would be the hubs of the system to distribute riders to the area’s many far-flung neighborhoods and recreational areas.

Even though the proposed system is an aerial tramway, the concept is based on the idea of a “Subway in the Sky” - an integrated, regional system of safe, reliable, timely, personal transportation. The aerial tramway system proposed here is one approach to solving the long-term transportation needs of locals and visitors in a way that reduces reliance on automobiles and imported fossil fuel.

This transit technology is applicable to our region in that surface routes are limited and rights of way costly, so aerial, point-to-point systems make sense to move people.

The fact that only the system’s towers and stations would have land footprint and erosion impacts makes this transit mode more suitable to the region’s sensitive areas than surface-based modes.

**Figure 10 - A "Subway in the Sky"**

These lines will start with a focus on serving the more profitable destinations that would have the highest potential ridership (and take the most cars off of Highway 89 between Truckee and Squaw Valley and Alpine Meadows and Highway 267 between Truckee and Northstar). Eventually, lines could extend or branch to serve other destinations in the Truckee Tahoe Region, such as Tahoe City to Crystal Bay (or in Truckee to serve Donner Lake and Truckee’s far flung neighborhoods, schools, and the two commercial centers).

*Imagine that one Winter day, rather than digging out your car and clearing your driveway’s snow berm, driving into town, and then finding parking - that you could instead wait a few minutes in a comfortable station, board a gondola (color-coded for your destination), and then get whisked into town or to a local ski resort, park, or school. Imagine too that instead of fighting congested, icy streets that you had the luxury of reading a paper, using your PC or cell phone, or playing with your kids as you are delivered safely to your destination.*

The following link leads to the Aerial Tramway’s web site.

**Tahoe Truckee Aerial Tramway**

Unlike creating a surface-based light rail or bus system, there are advantages to running the gondola lines above ground in our region. These advantages include: lower right of way costs, reduced land footprint and impacts, less snow removal and maintenance costs, and more point-to-point access in an area that is really a set of towns, ski resorts, and service areas that are laid out as the spokes of a wheel.

Energy Efficiency: Aerial people movers use less energy per passenger mile than any other form of mass transportation. A fully loaded aerial people mover uses about 250 BTU/passenger-mile compared to 3,500 BTU/passenger-mile for light rail or bus systems. The energy savings come from a variety of factors that include a stationary drive system, constant rope speed and a low carrier to passenger weight ratio.

In terms of capacity, aerial tramways are the most cost efficient aerial people mover using 8 passenger gondolas. Using these gondolas, the system can transport 2,800 passengers per hour in each direction (equal to a fully loaded 40 passenger bus leaving each terminal every 52 seconds).
How the System Fits the Local Needs

Our area with its relatively small year-round population dispersed over a miles-wide region cannot afford traditional urban light rail or other high rider density type systems. However, on weekends and holidays our region blooms from tens or thousands to well over 100,000 people – all on the same roads – sometimes impossible to navigate. In an emergency, this could be a disaster.

Other considerations include:

- The proposed tram system features the advantages of being “on-demand” - which is important in our harsh weather environment – making it impractical to expect tourists and workers to wait in the snow for a bus. Another color coded tram gondola would be available in minutes if you “missed” your first try.
- The elimination of the need for the majority of snow removal from the system avoids a huge on-going cost.
- The area has a lot of staff trained in operating and maintaining these systems. Even so, the low staffing requirements and automated nature of the system make significant reductions in labor costs.

The System’s Potential Benefits

The system envisioned offers several potential advantages. In addition there may be “pay-back” funding from some of the various shared cost savings or post construction revenue streams (such as those outlined below). Possible cost offsets would arise from:

- Reduced road use costs - maintenance (less chained-tire wear and tear, less snow removal and sanding), less tire and oil run-off, less gas used and tailpipe emissions.
- Potential sales of carbon offsets could be significant.
- Less long range road building and maintenance would be needed less asphalt, less labor, lower land use costs.
- The potential for increased area-wide economic vitality would help keep Truckee-Tahoe “the” major California destination resort - possibly increasing sales tax revenues, hotel tax, and creating more jobs for locals to build and run the lines and related businesses.
- Advertising on the gondolas and at the stations would generate some revenue.
- Cell and Wi-Fi rights on the towers and use fees could be revenue positive.
- Utility (power and cable) lines could be strung on upper branches of towers and be part of the cost structure.
- The local school district could avoid the costs of running some of their bus fleet.
Details of the Proposed Aerial Tramway Solution

Imagine waiting in a comfortable station, boarding a gondola with only a few other people, and then having the luxury of reading a paper, using your PC or cell phone, or playing with your kids as you are whisked into town instead of fighting ever increasing surface street congestion.

The solution advocated in this proposal is to create a region-wide transportation system using 3-cable detachable aerial trams. The system would, for the most part, use “off-the-shelf” technologies to avoid costly development efforts. The tram system would use 6-8 passenger gondolas to transport people (and their baggage and sports gear) between the residential neighborhoods, commercial districts, schools, and resorts and recreation facilities. A series of stations would be the hubs of the system.

Even though the proposed system is an aerial tramway, the concept is based on the idea of a “subway in the sky” - an integrated, regional system of safe, reliable, timely, personal transportation.

The system would be a world-class transit asset in a world-class resort region. Local residents and international visitors alike could be assured of easily getting on a gondola to their destination every few minutes, unlike waiting for an infrequent (and often late) bus.

This system or one that delivered the same benefits could be the key to future sustainable growth in our region without having to pave over our paradise.

The advantages in running the lines above ground are: lower right of way costs, reduced land footprint and impact, less snow removal and maintenance costs, and more point-to-point access in an area that is really a set of towns, ski resorts, and service areas that are in effect the spokes of a wheel.

The system of 6 to 8 person detachable gondolas with above ground stations and transfer points offers several advantages:

- Individual to small group sized gondolas would allow for the transportation of visitors, area workers, and their baggage and sports equipment far more readily than using a bus.

- Large groups or families with baggage could rent two gondolas in sequence to stay together. Valet service would be available to help with gear or special needs passengers.

- Gondolas would allow users to have far more flexible transit scheduling – with a minimum of initial wait times and layover delays.

- Special non-passenger gondolas could be reserved to transport goods and make deliveries to local businesses – much like a local parcel service. Possibly the system could have special flatbed gondolas for bikes or large parcels.
The Routes

The town of Truckee is the 9th largest city (in area) in California – but in terms of populated areas it is really a widely dispersed set of neighborhoods. It is the peculiar nature of Truckee’s neighborhoods (which are widespread and relatively isolated from each other) and the lack of in-fill plans which lends itself more than many towns to a series of point-to-point aerial tram lines. Even though the tram average speed will be significantly slower than auto travel, the lack of stop signs and traffic and parking delays will help push up the average capacity.

The fully implemented Truckee System would serve the residential, business, and recreational areas of Truckee. The main line would terminate at the East and/or West end Beach of Donner Lake and at the Glenshire Elementary School in the East. A connector line would serve the Pioneer Commerce Center and the Alder Creek Middle School. Another connector line would extend from the main station up to the Tahoe Donner Subdivision. A major trunk line would connect downtown Truckee to the Truckee River Regional Park, the Riverview Soccer Complex, the Truckee Airport, the Northstar Ski Resort, and (eventually perhaps) over to North Tahoe, connecting to Stateline. Another major trunk line would serve the Squaw Valley and Alpine Meadows Ski Areas and then to Tahoe City. A possible line could connect Alpine Meadows and the Homewood resorts. All these connections would help eliminate a considerable amount of carbon footprint and reduce pollution impacts of all that inter-resort car travel.

The proposed station scheme would make it so that locals and visitors were always within a short walk or shuttle ride of a station near a commercial or recreational area.

Also there would be special stops at the area’s schools. Access at these points would be limited so that only carded students, parents, teachers, and staff could embark or disembark at these campuses for reasons of student safety. At night, the gondolas would not even stop at the schools (unless the rider had a special event permit).

The Full System Option

The full system as shown below would serve the entire Town of Truckee in Nevada County and would connect to the major ski areas on Highways 89 and 267 and the North West quadrant of Lake Tahoe.

Figure 12 - The Full System Option

This schema integrates the local’s and visitor’s service lines into one coherent regional transportation system. This integrated system would offer the most service to the most people and would allow students to get to school, workers to get to work, and visitors to get to the area’s many recreational and resort areas with a minimum of driving. Groups of visitors could split up for the day and not have to have a second car or need excess driving to reach a variety of destinations.

Placer County-Only Option

If the Town of Truckee and its special districts were not able to be part of the system there would still be significant service areas in Placer Country that could take advantage of the system.
This option, while less than optimal, would serve to move masses of people from a parking structure and tram station in the Placer County portions of Truckee (by the Hwy. 89 “Mouse Hole” and Truckee Airport to many of the North Tahoe area’s skiing, biking, golfing, boating & fishing, and hiking recreation areas in direct lines of sight, with minimal jurisdictional overlap and no Town of Truckee involvement and permitting. This line could even extend up to Royal Gorge. This would benefit skiers and other recreational visitors more than locals and workers and students.

Figure 13 - The Placer-only Option

The Town of Truckee Option

This option would serve locations only within the Town of Truckee and would primarily be a local’s, worker’s, and student’s service line. Therefore, the ridership would be lower, while the average fare would possibly have to be higher. Eventually, the blue line could extend the system down to the Hwy. 89 resorts and Squaw Valley and Alpine Meadows.

Figure 14 - The Truckee Option

In these schemas these lines would converge at a centrally located Main Station in one of several potentially available Truckee locations.
• The map above shows a good site which would be the triangle of property to the north of the Old Brockway grade leading up out of Truckee – at the entrance to Hilltop.

• One location could be at either West or East end of the Sierra College Campus (“Hippy Hill”).

• Another location could be at the old railroad water tower (the Henrickson property).

• Another potential location could be the river bend south of West River St. (where Top Dog Timber is now).

• One solution would be to locate the station in Placer County, just south of the Hwy 89 and West River Street Junction.

• Another site would be at or near the Pioneer Commerce Center – such as the old Forest Service Office.

• Another site would be the property to the north of the proposed rail yard project (Hall’s Excavating’s yard and Trout Creek Nursery).

• Another site might be the old Truckee River Bank, Dot’s Place, and the “Blue House” hill.

Each of these locations would have some advantages and challenges in terms of lines of sight to terminal stations, variations in overpass rights, and walking access to certain parts of town. For example, a station at the Hilltop area would align between the Alder Creek Middle School and the Hwy. 89 ski resorts. Another example would be to terminate the West-bound line at the Donner Creek Interchange near the old hotel site near Taco Bell to avoid crossing the Donner State Park line.

The Stations

There would be several types of stations: one “Main” Station, Switching Stations, In-Line Stations, Terminal Stations, and a Maintenance Station / Tram Barn. The stations would all be, in effect, “inter-modal” transit hubs with some parking, shuttle and long haul bus stops, car and bike rentals and some basic food and news stand type services.

Each neighborhood way-station would be served by shuttle service that ran every 15 minutes to pick you up or drop you off at your doorstep. One suggestion would be to integrate a fleet of small electric vehicles into each station to serve its neighborhood or recreational facilities.

• **The Main Station** – the Main Station would be the hub of the system and would be a switching station with connections to all the other tram lines. This station would have visitor services facilities and have inter-modal connections to the train, buses, and other connections. This station would have some paid parking, vendors for food and supplies, ticket stations for the ski resorts, and hotel valet services. The system control room and staff and security offices would be in this facility. In the Main, Switching, and Terminal Stations riders could store bikes, packs, and ski gear in lockers.

• **Switching Stations (Roundhouse Stations)** - These stations would be situated in key locations that offer branching of lines into other tram lines. These stations would have a large, slow moving oval loop and a switching or pass-through system that would serve as the interchange between the various main lines, connector lines, and major trunk lines. A series of commands keyed into the rider’s ticket would dictate the automatic switching of the gondolas to their destination (which would also determine the fare). If they just got the ticket for the Red line and got on a Red car, that’s all they would need to do to get to the "Red Resort," for example. One Switching Station would serve Squaw Valley and another would serve a branch line into Alpine Meadows and on to Tahoe City. A Switching Station in Truckee would serve branch lines to Glenshire, to the Truckee Airport and to Northstar, and to the Hwy. 89 North (Alder Creek area).
• **In-Line Stations** - The system will need In-Line or Way-stations for several reasons: to collect and disperse riders closer to their neighborhoods than via the Main, Terminal, or Switching Stations and to accommodate major changes in the line’s direction. The in-line way-stations would be simple raised platforms with stairs and wheelchair lifts. Riders would be dropped off or take a neighborhood shuttle bus, or bike, ski, or walk to these stations. In-line Station locations would include: College Hill, Truckee High (at the N.E. corner of Northwoods & Donner Pass Rd.), Olympic Heights, Pioneer Commerce, Gateway, Downtown Truckee, Hwy. 89 campgrounds and Big Chief.

• **Terminal Stations** - The Terminal Stations would be at the ends of each line. At the terminal stations large, multi-level parking garages would be “hidden” behind a “wrap around” set of shops and visitor services store-fronts. The sales of vendor permits, parking, valet services, and advertising space would help defray station operating expenses. These stations would have connections to other local transit. These stations would have paid bike and gear storage. The lines would simply loop at these stations and a passenger could either board or disembark at these platforms. The Easternmost terminal would be at the Glenshire subdivision (near the elementary school). The Westernmost terminal would be near the
Donner Lake East or West End Beach. The two Northern-most terminals would be at Rainbow Dr. off of Hwy. 89 North and at the Tahoe Donner Ski Hill. There would eventually be terminals within the boundaries of the Squaw Valley and Alpine Meadows that would be trunk lines off of the Hwy. 89 South Switching Stations. The Tahoe City hub could be across the footbridge over the Truckee River. Eventually there would be a Terminal Station in Kings Beach and the Tahoe City station would become a Switching Station.

Figure 17 – Sample Terminal Station

- **Maintenance Stations / Gondola Barns & Car Parks** – All major stations would have direct ties to large enough parking structures to accommodate the full capacity influx of cars. These multi-level car parks would serve double duty as gondola barns to store “off-line” gondolas. As the parking places in the structure fill will cars, the gondolas would go “on-line.” The street sides of the parking structures would have vendor stalls and baggage service booths. These stations would serve the Main Station and the Terminal Stations with maintenance tools, hoists, and facilities to work on the gondolas.

Figure 18 - Truckee Main Roundtable Station
**Stations and Their Services Areas**

The following table details the stations, the station type, and their service areas. Ingress and egress to the limited access stations would be controlled (ID controls on the gates) to limit access times and grant access only to students, parents, staff, and other district personnel.

<table>
<thead>
<tr>
<th>Station</th>
<th>Line / Service Area</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hirschdale</td>
<td>Glenshire / Glenshire</td>
<td>Terminal</td>
</tr>
<tr>
<td>Glenshire Elementary School</td>
<td>Glenshire / Glenshire</td>
<td>School (Limited Access)</td>
</tr>
<tr>
<td>Glenshire Bluff</td>
<td>Glenshire / Glenshire</td>
<td>In-line Station (Neighborhood Transfer)</td>
</tr>
<tr>
<td>Olympic Heights</td>
<td>Glenshire / Olympic Heights</td>
<td>In-line Station (Neighborhood Transfer)</td>
</tr>
<tr>
<td>Railyard</td>
<td>Glenshire / Downtown</td>
<td>In-line Station (Neighborhood Transfer)</td>
</tr>
<tr>
<td>Hilltop</td>
<td>Regional Park / Sierra Meadows</td>
<td>Main Station</td>
</tr>
<tr>
<td>Rodeo Grounds</td>
<td>Northstar / Seniors</td>
<td>In-line Station (Neighborhood Transfer)</td>
</tr>
<tr>
<td>Airport</td>
<td>Northstar / Town Hall &amp; Hampton Inn</td>
<td>In-line Station (Neighborhood Transfer)</td>
</tr>
<tr>
<td>Northstar</td>
<td>Northstar / Northstar Resort / Ritz Carlton</td>
<td>Terminal (Neighborhood Transfer)</td>
</tr>
<tr>
<td>West River</td>
<td>West River / Downtown &amp; Brickletown</td>
<td>In-line Station (Neighborhood Transfer)</td>
</tr>
<tr>
<td>College Station</td>
<td>West River / Sierra College &amp; Deerfield Center</td>
<td>In-line Station (Neighborhood Transfer)</td>
</tr>
<tr>
<td>Truckee High School</td>
<td>Truckee High &amp; Elementary</td>
<td>School (Limited Access)</td>
</tr>
<tr>
<td>McGyver Dairy</td>
<td>Donner Lake / Gateway</td>
<td>In-line Station</td>
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<td>Gateway</td>
<td>Donner Lake / Gateway Center</td>
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<td>West Donner Lake</td>
<td>Donner Lake / State Park</td>
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<td>East Donner Lake</td>
<td>Donner Lake / West End Beach</td>
<td>Terminal Station</td>
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<td>Lower Tahoe Donner</td>
<td>Tahoe Donner Lower Lodge</td>
<td>In-line Station (Neighborhood Transfer)</td>
</tr>
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<td>Station Location</td>
<td>Phase I</td>
<td>Phase II</td>
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<tr>
<td>Western Terminal</td>
<td>Cold Stream / Donner Lake Interchange</td>
<td>Donner Lake Boat Ramp / W. End Beach</td>
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<tr>
<td>Eastern Terminal</td>
<td>Glenshire Drive at Old 40</td>
<td>Glenshire Elementary</td>
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<tr>
<td>South Eastern Terminal</td>
<td>Truckee Airport</td>
<td>Northstar</td>
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<td>South Western Terminal</td>
<td>Alpine Meadows</td>
<td>Tahoe City</td>
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<td>North Eastern Terminal</td>
<td>Alder Creek and Hwy. 89 N.</td>
<td>Rainbow Drive</td>
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<tr>
<td>North Western Terminal</td>
<td>Tahoe Donner Clubhouse (Northwoods Junction)</td>
<td>Tahoe Donner Clubhouse (Trout Cr.)</td>
</tr>
</tbody>
</table>

Table 2 - Stations & Service Areas

The locations of the Terminal Stations will change as the lines expand and some of these early Terminal Stations will become In-line Stations. The table below shows this projected expansion.

Table 3- Future Terminal Locations

4/4/2011

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**Rider Services**

For the system to be a success in the fullest sense of the word it must have excellent, comprehensive rider services such as fool-proof baggage handling, valet and sky cap services, rental lockers, and even tour guides or trip escorts for young riders.

Each station would have a range of services depending on the size and type of station. Even the In-line Stations would have a small valet/sky cap services staff, a small number of rental lockers, links to other transit, and automated baggage handling. The larger Terminal and Main Stations would have valet parking, coffee and news stands, small food vendors, sports equipment rental stands and lockers & parcel storage.

**The Business of Baggage Handling**

As part of the system’s rider services there must be fool-proof baggage handling. An essential part of the customer’s satisfaction with their tram-transport experience will be how well we handle and keep safe their baggage and gear (such as bikes or skis or boards). The methods proposed here owe their “customer-focused” orientation to the work of Brian Dickinson of Logical Conclusions, Inc. whose analysis showed that every good or service we provide should be seamless to the customer and not like the usual departmental or process divisions that fracture the customer experience. In this case I derive my thoughts from his work on airline passenger and baggage handling. In his schema the plan was to treat the customer and their gear and luggage as an inseparable unit to the point of boarding and un-boarding the plane in or closer to the baggage area.

This proposal envisions the riders’ first act after showing their pass or buying their tickets would be to be given one or more luggage and gear carts (practically right at curbside). They would then stow their luggage and gear in these bar coded, 4-wheeled carts. Some of these carts would be customized to best store bikes, skis, or other oversized items. These carts would have flip up handles, that when raised, would lower the wheels to make getting to the tram car and then out of then next station easier. Then, when the handle is folded in, the wheels retract to attach the cart to the back of your gondola as you board it.

The loading side of the tram stations would always be a little higher than the unloading side of the station platform. When ready to board, the passenger would push their gear cart into slots in a shallow tray in the platform next to their boarding zone. When the desired tram car was ready to board, this tray and its carts would drop in and attach itself to the bottom and back of the gondola. Weather sensitive stuff would be in the sealed carts. These carts would then accompany the passengers until their station stop (or even to their hotel while they went to the ski slopes). When they get off the gondola at their station or recreation area, the tray and its carts slides down to the baggage claim portion of the station’s loading carrousel.

Customers could opt to have their luggage sent ahead to their hotel while they start the day at the slopes or water skiing in the summertime. Also, the system operator would relationships with gear rental agencies who may offer on-line reservations to make it so that when the riders got to their tram station, pre-loaded carts of gears tubs with skis and boots and poles, bikes, or water skis, etc. could meet them at the station.

To transition from the stations to the real “wheeled” world, these baggage carts could be joined in a train down to curbside. Then a whole cart or tubs could be off-loaded to flat bed golf carts, tour or shuttle bus bottom bays, or even onto a snow sled without lots of lifting and get to them to their destination and ensured delivery by the tram system’s concierge services (like bell boys on wheels). The visitors could conceivably send out for pizza or even have dry cleaning done done via the tram.

These are ways to almost “fail safe” the customer baggage and gear experience that will make users want to return to enjoy the travel experience in the region.
## Estimated Travel Times

Trams can travel at 1000 feet per minute (or about 17.75 MPH). The following are projected travel times from station to station.

<table>
<thead>
<tr>
<th>Station</th>
<th>Destination</th>
<th>Miles</th>
<th>17 MPH Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Station (West River &amp; Cold Stream)</td>
<td>Donner Interchange (Way station - Walk-in &amp; Bikes)</td>
<td>1.75</td>
<td>7 Minutes</td>
</tr>
<tr>
<td>Main Station (West River &amp; Cold Stream)</td>
<td>Donner Lake West End (Terminal with Parking)</td>
<td>5.25</td>
<td>19 Minutes</td>
</tr>
<tr>
<td>Main Station (West River &amp; Cold Stream)</td>
<td>Tahoe Donner 1 (Lower Northwoods Clubhouse – Way station with Parking)</td>
<td>3.0</td>
<td>22 Minutes</td>
</tr>
<tr>
<td>Main Station (West River &amp; Cold Stream)</td>
<td>Tahoe Donner 2 (Ski Hill – Terminal with Parking)</td>
<td>6.5</td>
<td>23 Minutes</td>
</tr>
<tr>
<td>Main Station (West River &amp; Cold Stream)</td>
<td>Alder Station (Way station - Walk-in &amp; Bikes)</td>
<td>5.0</td>
<td>18 Minutes</td>
</tr>
<tr>
<td>Main Station (West River &amp; Cold Stream)</td>
<td>Rainbow Station (Terminal – Walk-in &amp; Bikes)</td>
<td>6.0</td>
<td>22 Minutes</td>
</tr>
<tr>
<td>Main Station (West River &amp; Cold Stream)</td>
<td>Olympic Heights 1 (Way station – Walk-in &amp; Bikes)</td>
<td>2.5</td>
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<tr>
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<td>Olympic Heights 2 (Way station – Walk-in &amp; Bikes)</td>
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<td>Glenshire Station (Terminal – Walk-in &amp; Bikes)</td>
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<td>Pallisades Station (Way station – Walk-in &amp; Bikes)</td>
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<td>Riverview Park Station (Way station – Walk-in</td>
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<tr>
<td>Station</td>
<td>Destination</td>
<td>Miles</td>
<td>17 MPH Travel Time</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
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<tr>
<td>&amp; Bikes</td>
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<td></td>
</tr>
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<td>Airport Station (Way station with Parking)</td>
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<td>Northstar Station (Terminal with Parking)</td>
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<td>Main Station (West River &amp; Cold Stream)</td>
<td>Squaw Valley Station</td>
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<td>32 Minutes</td>
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<td>Main Station (West River &amp; Cold Stream)</td>
<td>Alpine Meadows</td>
<td>10.0</td>
<td>36 Minutes</td>
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<td>Main Station (West River &amp; Cold Stream)</td>
<td>Tahoe City</td>
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<td>Donner Lake West End</td>
<td>Glenshire Station</td>
<td>11.75</td>
<td>42 Minutes</td>
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<td>Tahoe Donner 2 Ski Hill</td>
<td>Northstar Station</td>
<td>13.5</td>
<td>48 Minutes</td>
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<td>Rainbow Station</td>
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<td>Rainbow Station</td>
<td>Northstar</td>
<td>13.0</td>
<td>46 Minutes</td>
</tr>
</tbody>
</table>

Table 4 - Estimated Travel Times

Travel times depend on passenger volume, boarding times, wind conditions, and the “pass-through” capabilities of the intervening way stations.

The Switching System

The Doppelmayr Ctec Company already makes a “combination” system in which gondolas and chairlifts can be interspersed on the same line and the ratio of gondolas to chairs can be varied as needed. With this system, the tramway would be configurable to put the required number of destination-coded gondolas on the line (instead of using chair-type lifts).

The Leitner Poma Company makes a series of products which may be applicable including a “Pulsed Gondola System.” This system trains with one, two or three carrier vehicles (and up to six evenly spaced trains on the rope). The system is designed to slow down for loading and unloading when the vehicles are in the terminals. The vehicles have options for heat and communication. Pulsed gondolas are generally used for distances less than 3,000 ft., but can go up to three miles as was done in Perugia, Italy. Pulsed Gondola lifts are an excellent option for pedestrian traffic and offer ideal comfort, transporting up to 500 passengers per hour with line speeds up to 5 meters per second.

In some respects, this aerial tramway line switching mechanism is perhaps the only novel idea in the whole proposal and may require some R&D and proof of concept and safety testing. Traditional approaches, such as having lines simply terminating at a shared platform – requiring un-boarding and re-boarding would simplify the technology, but lessen the experience.

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In this proposal I am proposing a “shuttlecock” system in which only a carrier called a “shuttlecock” is attached to the cable and the individual gondolas are paired to a shuttlecock that is pre-keyed for their destination and controls its own switching through the roundhouse.

The first implementation of the system may utilize strictly commercially available stations where each line terminates in a shared platform – requiring passengers going to further destinations to disembark and then re-embark to another “train.”

Using this “off-the-shelf” approach simplifies the initial design, removes the need for any new technology development and certification, and reduces costs; making the initial system far more “shovel ready”. A key design feature would be to allow for the inclusion of a switching system at a later date to allow riders to reach any destination without disembarking and re-embarking. The initial system budget and timeline may be based on this simplified design unless an existing switching system is practical and affordable.

The switching system could be a phase two retro-fit that would allow users to easily reach their final destinations. One option would be for the rider to board a color coded gondola to get automatically taken to their matching color-coded destination. Another option would be that each gondola could be controlled by the user (by simply pulling a lever after boarding that would control the switch mechanism’s behavior to shuttle the gondola through the stations to the correct destination).

Figure 19 - Stage 1 Station without Switch & Shared Platform
My suggested refinement is to have a series of mechanisms in the stations to act as a switching system to allow a gondola cab to be shunted off from one line to another at slow speed. In essence, “lifter” wheels would rise on a sloped ¼ circle “shuttlecock switch” in the stations. The rotation of the ¼ circle switch would vector the tram to another line.

There are some of the advantages of having fully detachable gondolas in which only the shuttles stay attached to the lines at all times. The system would, in most conditions, run with 2 out of 3 shuttles occupied. Under low-usage conditions the gondola to shuttle occupancy ratio would be 1 out of 3 (reducing system weight and wind loads and energy usage). In high-demand situations (holiday weekends, etc.) all 3 shuttles per gondola
“destination set” would be filled. Yet another flexible aspect of the system would be the ability to bring on-line one or more specialized gondolas as needed (for transporting those with special needs, for using flat-bed load carrying gondolas, or for adding more gondolas to one of the colored lines to increase that destination’s capacity temporarily.

The quarter circle “shuttlecock” switch mechanism proposed provides several advantages in terms of system flexibility and on-demand gondola routing. For example, in “school bus stop” mode, the system would be preloaded with a set of “same destination” gondolas to reach schools to and from neighborhoods as needed. Then, the system could go into “normal mode” with a full or partial load of interspersed series of red, green, blue, etc. gondolas. A user could request a special gondola with an attendant for handicapped persons or children needing escort. Or, they could request a load hauler gondola for baggage delivery to a resort. Small sidings attached to each in-line station would contain a small selection of these extra gondolas.

In most cases, the “quarter switch” would be in pass through mode and the line’s gondolas would simply loop around. In cases where a user has a transfer at the main station to an ultimate destination, the “quarter switch” diverts their gondola onto the other line.

Another component of the system would be a large oval that would rotate, switching the gondolas to the various lines as needed. This would be much like an old-fashioned “distributor” in automobile engine.

Figure 22 - The Distributor

A “destination set” is a grouping of color coded gondolas (clumped by destinations). For example, each grouping would include a gondola car for the Red, Purple, Blue, Yellow, or Green lines. Taking sets off-line or putting them on-line simply changes the frequency of the station stops based on customer demand.
Figure 23 - Shuttlecock Switching System Top View

Figure 24 - 3 “Quarter“ Switch Positions

Figure 25 - Shuttlecock Switching System 3-D View
Undercrossings & Line Angles

In some areas – due to height restrictions and factors such as the lack of overhead rights of way, the tramway may have to dip to near street level – almost like a string of cable cars. Special towers would drop the line into the street level mode where small wheeled rails could guide the gondolas in the underpass. Examples of the locations where such a street level interchange would be under Highway 80 at Bridge Street or at the airport. These street-level points may be used as in-line stations – for example – at the old Truckee River Bank building.

![Figure 26 - Sample Undercrossing](image)

Although tramway routes typically must travel in a straight line (usually with one degree), turning stations have been developed to accommodate more radical changes in line direction. Even without these special turning stations, in most cases, the location of the system’s in-line stations would coincide with where the line would need a change of direction.

![Figure 27 - Turning Station](image)
Section III – Costs, Benefits, & Stakeholders

Projected Costs

The costs of constructing and operating the system must be considered in light of the benefits gained in the short term and longer term as the system amortizes itself through continued use. The economic viability of the system will depend on a consistent ridership comprised of visitors and local repeat riders in addition to the revenue generated by other sources such as parking fees, advertising fees, carbon offset sales, and vendor rental fees. In order to understand the system’s economics a survey must be conducted to determine ridership potential and the costs of delivering service (and therefore the ticket pricing). Pricing factors (such as school district student ticket pricing or neighborhood association member pricing) would all have to be considered in the study. A weight- or volume-based price structure would also have to be devised for freight if that service proved to be a profit center. These combined factors (of ridership and ticket price and other revenues) balanced with capital and operating costs will dictate the true cost of the system.

The tables below show some projected costs of the major system elements.

Infrastructure Costs

<table>
<thead>
<tr>
<th>Towers Per Mile</th>
<th>Miles of Line</th>
<th>Total Towers</th>
<th>Cost Per Tower</th>
<th>Towers</th>
<th>Total Cost</th>
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<tbody>
<tr>
<td>8</td>
<td>45</td>
<td>360</td>
<td>$500,000</td>
<td>360</td>
<td>$180,000,000</td>
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Cable

<table>
<thead>
<tr>
<th>Number of Cables Per Mile</th>
<th>Miles of Line</th>
<th>Total Miles of Cable</th>
<th>Cost Per Mile</th>
<th>Total Miles of Cable</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>45</td>
<td>270</td>
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<td>270</td>
<td>$4,050,000</td>
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</table>

Table 5 – Projected Infrastructure & Facilities Costs

Gondola Costs

<table>
<thead>
<tr>
<th>Number of Gondolas Per Mile</th>
<th>Miles of Line</th>
<th>Total Gondolas</th>
<th>Cost Per Gondola</th>
<th>Total Gondolas</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>45</td>
<td>720</td>
<td>$18,500</td>
<td>720</td>
<td>$13,320,000</td>
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</table>

Table 6 – Projected Gondola Costs
## Station Costs

<table>
<thead>
<tr>
<th>Station Location</th>
<th>Area Served</th>
<th>Station Type</th>
<th>Station Cost</th>
<th>Acreage</th>
<th>Land Costs ($650,000 Acre)</th>
<th>Combined Land &amp; Structure Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hirschdale</td>
<td>Glenshire / Glenshire</td>
<td>Terminal</td>
<td>$17,500,000</td>
<td>5</td>
<td>$3,250,000</td>
<td>$20,750,000</td>
</tr>
<tr>
<td>Glenshire Elementary School</td>
<td>Glenshire / Glenshire</td>
<td>School (Limited Access)</td>
<td>$10,000,000</td>
<td>1</td>
<td>$650,000</td>
<td>$10,650,000</td>
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<tr>
<td>Glenshire Bluff</td>
<td>Glenshire / Glenshire</td>
<td>In-line Station (Neighborhood Transfer)</td>
<td>$7,500,000</td>
<td>1</td>
<td>$650,000</td>
<td>$8,150,000</td>
</tr>
<tr>
<td>Olympic Heights</td>
<td>Glenshire / Olympic Heights</td>
<td>In-line Station (Neighborhood Transfer)</td>
<td>$7,500,000</td>
<td>1</td>
<td>$650,000</td>
<td>$8,150,000</td>
</tr>
<tr>
<td>Railyard</td>
<td>Glenshire / Downtown</td>
<td>In-line Station (Neighborhood Transfer)</td>
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<td>1</td>
<td>$650,000</td>
<td>$8,150,000</td>
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<tr>
<td>Hilltop</td>
<td>Regional Park / Sierra Meadows</td>
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<tr>
<td>Rodeo Grounds</td>
<td>Northstar / Seniors</td>
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<td>$650,000</td>
<td>$8,150,000</td>
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<tr>
<td>Airport</td>
<td>Northstar / Town Hall &amp; Hampton Inn</td>
<td>In-line Station (Neighborhood Transfer)</td>
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<td>$8,150,000</td>
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<tr>
<td>Northstar</td>
<td>Northstar / Northstar Resort / Ritz Carlton</td>
<td>Terminal (Neighborhood Transfer)</td>
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<td>5</td>
<td>$3,250,000</td>
<td>$20,750,000</td>
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<tr>
<td>West River</td>
<td>West River / Downtown &amp; Brickletown</td>
<td>In-line Station (Neighborhood Transfer)</td>
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<td>$650,000</td>
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<tr>
<td>College Station</td>
<td>West River / Sierra College &amp; Deerfield Center</td>
<td>In-line Station (Neighborhood Transfer)</td>
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<td>1</td>
<td>$650,000</td>
<td>$8,150,000</td>
</tr>
<tr>
<td>Station Location</td>
<td>Area Served</td>
<td>Station Type</td>
<td>Station Cost</td>
<td>Acreage</td>
<td>Land Costs ($650,000 Acre)</td>
<td>Combined Land &amp; Structure Costs</td>
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<tr>
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<td>Truckee High &amp; Elementary</td>
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<td>McGyver Dairy</td>
<td>Donner Lake / Gateway</td>
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<td>Gateway</td>
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<td>West Donner Lake</td>
<td>Donner Lake / State Park</td>
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<td>East Donner Lake</td>
<td>Donner Lake / West End Beach</td>
<td>Terminal Station</td>
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<td>$3,250,000</td>
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<td>Lower Tahoe Donner</td>
<td>Tahoe Donner Lower Lodge</td>
<td>In-line Station (Neighborhood Transfer)</td>
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<td>$8,150,000</td>
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<td>Tahoe Donner Clubhouse</td>
<td>Tahoe Donner Golf Course</td>
<td>In-line Station (Neighborhood Transfer)</td>
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<td>1</td>
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<td>$8,150,000</td>
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<tr>
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<td>Upper Tahoe Donner</td>
<td>Terminal</td>
<td>$17,500,000</td>
<td>5</td>
<td>$3,250,000</td>
<td>$20,750,000</td>
</tr>
<tr>
<td>East Alder Creek &amp; Hwy 89 North</td>
<td>Alder / Alder Creek</td>
<td>Terminal</td>
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<td>2</td>
<td>$1,300,000</td>
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<td>Alder / Rainbow</td>
<td>In-line Station</td>
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<td>$650,000</td>
<td>$8,150,000</td>
</tr>
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<td>Prossor</td>
<td>Alder / Middle School</td>
<td>School Station</td>
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<td>$650,000</td>
<td>$10,650,000</td>
</tr>
<tr>
<td>Pioneer</td>
<td>Alder / Pioneer Trail</td>
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<td>Mouse Hole</td>
<td>Tahoe City / Donner Creek</td>
<td>In-line Station</td>
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<tr>
<td>Station Location</td>
<td>Area Served</td>
<td>Station Type</td>
<td>Station Cost</td>
<td>Acreage</td>
<td>Land Costs ($650,000 Acre)</td>
<td>Combined Land &amp; Structure Costs</td>
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<td>County Dump &amp; TART Offices</td>
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<td>Hwy. 89 Neighborhood</td>
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<td>$650,000</td>
<td>$8,150,000</td>
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<td>Squaw Valley</td>
<td>Squaw Valley Ski Resort</td>
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<td>$650,000</td>
<td>$13,150,000</td>
</tr>
<tr>
<td>Alpine Meadows</td>
<td>Alpine Meadows Ski Resort</td>
<td>Switching Station (Neighborhood Transfer)</td>
<td>$12,500,000</td>
<td>1</td>
<td>$650,000</td>
<td>$13,150,000</td>
</tr>
<tr>
<td>Tahoe City</td>
<td>North Lake Tahoe</td>
<td>Terminal</td>
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<td>5</td>
<td>$3,250,000</td>
<td>$20,750,000</td>
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<tr>
<td><strong>Total Station &amp; Land Costs</strong></td>
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<td></td>
<td></td>
<td><strong>$36,400,000.00</strong></td>
<td><strong>$371,400,000.00</strong></td>
</tr>
</tbody>
</table>

Table 7 - Projected Station Costs
Route Right of Way Costs

Right of Way costs are one of the largest cost variables. Some existing transportation and utility easements may be leased from existing rights holders while other routes would require new right of way leases – some from the U.S. Forest Service and some from private landholders (some of whom may benefit from the system).

<table>
<thead>
<tr>
<th>Route</th>
<th>Miles</th>
<th>Landowners</th>
<th>Existing RoW Holders</th>
<th>Cost Per Mile</th>
<th>Extended Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alder Creek to Tahoe City</td>
<td>15.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tahoe Donner to Northstar</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glenshire to Donner Lake</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back Side of Northstar to Squaw Valley</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back Side of Northstar to Alpine Meadows</td>
<td>7.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8 - Right of Way Costs
Benefits

The proposed aerial tramway system will have some benefits that manifest almost immediately and others that accrue over time. The initial paybacks include: lower pollution and energy use, lower travel-related risk, convenient public access to residential, recreational, and retail areas, increased tourism visitors, and lower road maintenance costs. The longer benefits that would accrue would come from factors such as: carbon offset sales, a healthier population (due to the small amount of additional walking and fewer car-related injuries), local access to state and federal mass transit dollars, and having a system in place when personally owned cars become less and less affordable and environmentally viable.

System Capacity

Potential Riders per Hour

A study conducted by the group “Reconnecting America” for the town of Hercules, CA cites existing reversible ropeway large gondola systems with cars carrying from 20 to 200 people traveling at 28 mph. These systems are capable of carrying from 500 to 2000 people per hour. The same study cites smaller “detachable” gondolas with 4-12 people capacities with potential ridership of 3600 people per hour travelling at 14 mph. Bi-cable and tri-cable systems combine some of the advantages of both reversible ropeway and detachable systems. These systems have smaller energy consumption, better wind stability, and longer spans between towers. These systems can accommodate up to thirty passengers and a riders per hour capacity of 6000 persons. The Dopplemayr Company rates their systems at 6000 passengers per hour and their systems reach speeds of over 17 MPH.

Potential Total System Capacity

If the fully built system of 45 miles of tram line had 8 gondolas per mile with an 8 passenger capacity, the system could accommodate 2,880 people at any given time. With ¼ hour trip times, the system could handle 72 “turns” in riders per 18 hour day. This means a potential total daily capacity of 207,360 people. Even if the system only ran at ½ capacity, that’s still over 100,000 riders per day that would otherwise take all or part of a personal car to take the same trip. Admittedly, there will be a mix of slow days and “peak” weekends that will cause these ridership numbers to vary seasonally. This “seasonality” of the ridership and how that may affect the economics of the system in terms of operating profits and losses must be studied.

Carbon Offsets

$1374.00 is the current market value of the carbon offsets achieved by pulling off the roads five Ford cars (Tempos and Taurus models driven 60,000 miles or 12,000 miles per year for a 5 year service life). The amount of CO2 not emitted in this scenario is 55,879 lbs. If the system could remove 5000 similar cars for five years, this would be a carbon value of $1,374,000 and an emissions reduction of 55,879,000 lbs. This “5000 cars off the road” figure is based on reducing the usage of 25,000 local and visitor cars by 20% over a five year period. (Few will use this system to the total exclusion of their personal vehicle as long as they can afford gas). If carbon offsets gain in value or if the system usage is greater, then the value of the total offsets increase. If the system displaced enough carbon, the offsets could be sold on the emerging cap and trade markets.

The system will of course use power for the electric motors and the station heating and lighting. There will need to be a 500 HP motor every 3 miles (about 15 motors) and the full system’s power requirements must be deducted from the carbon offset equations based on the number of cars taken off the road.
# Potential Revenues

The following table shows some revenue projections from advertising and ticket sales.

<table>
<thead>
<tr>
<th>Source</th>
<th>Revenue Sources &amp; Projections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advertising</strong></td>
<td></td>
</tr>
<tr>
<td>Projection Basis</td>
<td>Ad Spaces $1000 for Station Ad &amp; $500 for Gondola Ad</td>
</tr>
<tr>
<td></td>
<td>Ads Rate Times Ad Spaces</td>
</tr>
<tr>
<td>420 Station Ads</td>
<td>420</td>
</tr>
<tr>
<td></td>
<td>$12,000</td>
</tr>
<tr>
<td></td>
<td>$5,040,000</td>
</tr>
<tr>
<td>720 Gondola Ads</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td>$6,000</td>
</tr>
<tr>
<td></td>
<td>$4,320,000</td>
</tr>
<tr>
<td></td>
<td>$9,360,000</td>
</tr>
<tr>
<td><strong>Ticket Sales</strong></td>
<td></td>
</tr>
<tr>
<td>Projection Basis</td>
<td>26 Major Holiday Days with 10,000 Riders per Day</td>
</tr>
<tr>
<td></td>
<td>9.00 Ticket Riders Times Ticket Price</td>
</tr>
<tr>
<td>Yearly Non-Resident Holiday Riders</td>
<td>260000</td>
</tr>
<tr>
<td></td>
<td>$9</td>
</tr>
<tr>
<td></td>
<td>$2,340,000</td>
</tr>
<tr>
<td></td>
<td>$2,340,000</td>
</tr>
<tr>
<td>Projection Basis</td>
<td>90 Days with 5000 Riders per Day</td>
</tr>
<tr>
<td>Yearly Non-Resident Weekend Riders</td>
<td>450000</td>
</tr>
<tr>
<td></td>
<td>$9</td>
</tr>
<tr>
<td></td>
<td>$4,050,000</td>
</tr>
<tr>
<td></td>
<td>$4,050,000</td>
</tr>
<tr>
<td>Projection Basis</td>
<td>249 Days with 1000 Riders per Day</td>
</tr>
<tr>
<td>Yearly Non-Resident Weekday Riders</td>
<td>249000</td>
</tr>
<tr>
<td></td>
<td>$9</td>
</tr>
<tr>
<td></td>
<td>$2,241,000</td>
</tr>
<tr>
<td></td>
<td>$2,241,000</td>
</tr>
<tr>
<td>Projection Basis</td>
<td>5000 Students for 200 Days per Year</td>
</tr>
<tr>
<td>Yearly Student Pass Riders</td>
<td>1000000</td>
</tr>
<tr>
<td></td>
<td>$4</td>
</tr>
<tr>
<td></td>
<td>$4,000,000</td>
</tr>
<tr>
<td></td>
<td>$4,000,000</td>
</tr>
</tbody>
</table>
### Table 9 - Potential Revenue Sources

<table>
<thead>
<tr>
<th>Basis</th>
<th>750 Adult Riders Per Day for 365 Days</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly Adult Resident Pass Riders</td>
<td>273750</td>
<td>$5</td>
<td>$1,368,750</td>
<td>$1368750</td>
</tr>
<tr>
<td>Total Yearly Income</td>
<td></td>
<td></td>
<td></td>
<td>$23,359,750</td>
</tr>
</tbody>
</table>

While $23 million dollars is not an insignificant figure, that amount may in fact be only enough to cover operating expenses and not to amortize the system. However, other potential revenue sources, such as coop agreements with the region’s ski areas and resorts, transit tax subsidies, and even the eventual sales of carbon offsets may bolster this revenue stream.

### Stakeholders and Economic Factors

We are all in a sense “stakeholders” on this planet in that it is up to us to do the “right thing” to address current environmental problems for the future generations.

### Local Business Interests & Stakeholders

- **Riders and Freight Users** – These users are perhaps the primary stakeholders.

- **Regional Ski Resorts** – Northstar at Tahoe, Squaw Valley, Alpine Meadows & Homewood, the Tahoe Donner Ski Hill, and the Donner Summit Resorts are the economic engine that brings in the tourists, and employs the locals. It is in these businesses’ interests to make the area even more attractive, even “greener,” and to add a unique area-wide solution to the traffic and parking problems that may keep some guests away at peak times.

- **Area Golf Resorts** – In the spring and summer months the area’s major golf courses could benefit from a regional transit solution and may cooperate on a regional golf pass package.

- **Chambers of Commerce** – These business community organizations will probably support a regional solution that brings in and accommodates more visitors with less traffic and pollution impacts. Most areas will become “walk-able” in terms of their proximity to a station and to shops and services.

- **North Tahoe Resort Association** – The North Shore of Lake Tahoe needs a transit network that ties it together and that brings in more tourists while offering less environmental impacts.

- **The Holiday Rail Yard Development Group** – This group is very interested in re-vitalizing and expanding downtown Truckee in the old “balloon track” area. This major commercial area could be a vital link in the area’s overall transportation scheme – or at least should have a minor station in this system.

- **Downtown Merchants’ Association** – This group is normally interested in getting more walk-through traffic and greater commercial volume for its shops and restaurants.
• **Railroad and Bus Lines** – The Amtrak and Greyhound lines need to be integrated into this aerial tram scheme to facilitate passengers transferring from train or bus to tram (with their ski gear and baggage) and to easily make connections.

• **Teichert Aggregates** – This local company could provide a large portion of the materials used to build the system. They also may control import rights of way for the system to reach either Glenshire or Donner Lake.

• **Casinos** – the North Shore Casinos would benefit from increased tourism and could possibly provide shuttle service to and from their properties and the tram system. They may also be advertisers on the gondolas and in the stations.

**Local, State, & Federal Entities & Stakeholders**

• **Caltrans** – This agency would have vital oversight on the project and may be the most logical and appropriate “lead” agency.

• **The Town of Truckee** – The town would be a possible beneficiary of increased sales and occupancy tax dollars from increased tourists. It could also possibly be the recipient of public transportation development funds and accrue benefits from lower snow removal and road maintenance costs. The town could also possibly avoid costly road system expansion and associated parking problems and have lower air pollution ratings and fewer airborne health affects.

• **LAFCO** – This agency would have a large role if the system required the formation of a new special district. In fact this project would affect or need the active cooperation of most of the other special districts in the area.

• **The EPA** – The lead federal agency regulating any endeavor with potential impacts on environmental quality.

• **California Energy Commission** – This agency would be closely involved in any substantial alternative energy or energy conservation projects.

• **The California Air Resources Board** – This agency has an interest in lowering the smog impacts in our natural inversion basins. Less dust and road sanding impacts may attract them to the table as well.

• **Nevada County** – The county is a major zoning, regulatory, and land use stakeholder. It also may be a possible partner in transit planning and funding. It is also a road and public services provider that may experience reduced road maintenance costs.

• **Placer County** – The county is a major zoning, regulatory, and land use stakeholder. It is also a possible partner in transit planning and funding. It may also experience reduced road maintenance costs.

• **Lahonton Water Quality Control District** – This entity’s charter is to protect the water quality of the Truckee River and contributory streams. They will have regulatory oversight on any project with potential erosion and runoff effects.

• **The Airport District** – This special district is a potential partner in the land use / rights of way areas and a possible user of the tram lines to service their fly in visitors.

• **The Truckee Donner Public Utility District** – This district is another potential partner in the land use / rights of way areas as well as being the provider of the electrical power needed. The district could also get “green” dollars and infrastructure dollars – if the towers are part of a new smart-grid system. Local power generated (from biofuels, wind, and small hydro) could help power the system.
• **The Truckee Donner Recreation and Parks District** – This district is yet another potential partner in the land use / rights of way areas and an important player in terms of how the system serves the district’s many recreational areas.

• **Tahoe Donner, Glenshire, & Other Neighborhood Associations** – These groups may play a part in providing shuttle service in their neighborhoods to the stations. They may also hold key areas for staging towers and stations. Their residents would be the major local users of the system (homeowners and students may get special-rate passes – possibly assessed as part of their association dues).

• **Tahoe Truckee Unified School District** – As a smart, safe bus alternative this system could save the district millions in labor, equipment, fuel, and insurance costs. This may even be more important as the bus fleet ages and needs to be replaced with state-of-the-art, low-emissions vehicles. Snow days would still apply in high snow accumulation and wind situations, but the overall cost per rider may be far less than a bussed student.

• **Sierra College** – Sierra College’s new campus is an “island” in Truckee – with limited parking and no mass transit service. It needs better access to the rest of the town and the entire region. Having a way-station near the campus will get students and staff to and from the campus in a safe, prompt, and convenient fashion.

• **TART** – Tahoe Area Regional Transit is the bus-based existing transit system. It will still be a critical surface-based link in the area’s transportation web. The TART system will need to have an expanded local – quick response shuttle or dial-a-ride shuttle system to help riders make that final “last mile” link. TART may be the most logical managing entity for the tramway system.

• **TRPA** – The Tahoe Regional Planning Agency will have an important role in the planning and construction and permitting of the system if tram lines reach into the Tahoe Basin. Hopefully the TRPA will provide leadership in the effort in terms of greater access to the area with lower environmental footprint. The TRPA would be the logical channel for state and federal dollars into the financing of the system.

• **State of California Tram Board** – This board is the body that governs the operations of all Aerial Trams. The board will have the key regulatory oversight position over the tramway’s operations.

• **Area Emergency Services Providers** – The Tahoe Truckee Area’s police, fire, medical personnel, and other first responders will all be affected by this system. On the one hand there is the increased chance of petty crime in new public transit areas and there are special considerations with evacuating such a system. On the other hand, the system would be relatively private (4-6 people per tram), there would be less road traffic and perhaps fewer accidents, the web-cam security system would be self-policing with vandals or other perpetrators escorted off at the next station to pay for repairs. In an earthquake, the towers of the system might survive better than the roads and provide an additional means of either evacuating visitors or sending in emergency response teams.

### System Ownership and System Operating & Governing Entities

Even though we, as a society, have collectively and as individuals subsidized the existing road- and car-based infrastructure to the tune of billions of dollars, it is rather unlikely that area voters would approve of a strictly local tax based or bond based financing scheme for this system. Therefore, the construction funding most likely would have to come from an aggregate of venture capital, local industries, and governmental contributions.

This system crosses many jurisdictions and property lines and the project’s success involves the tacit or active participation (or at least tolerance) on the part of many governmental and corporate entities and special districts. Many of these are listed in the **Stakeholders** sections.
Ownership Models

The ownership of the system is one of the stickiest issues. Below are several models.

- **A Consortium** - Some of the stakeholders could provide some funding. One solution would be for a consortium of the major served industries and major employers and users own the system. This would be an investment-level based ownership share (that could be sold with right of first refusal) if the transportation situation or ownership changed. Another cost sharing option would be for the terminal stations at Squaw and Alpine and at Soda Springs and at Northstar at Tahoe to be owned by their respective ski corporations with an inalienable right of way passage for other lines and a right of first refusal to the line owners in case of sale. This off loads the some of the maintenance and cleaning and some staffing and security costs to these station owners.

- **The RR Model** – One approach would be to have one entity build and own the tramway’s lines, towers, motors, and most of the stations and maintenance sheds, etc. This would be the “Tahoe Truckee Aerial Tramway.” It would have some of its own “rolling stock” in the railroad metaphor. Then, the bulk users such as the school district, the major employers, the ski resorts and casinos, etc. would own their own stock of Gondolas (customized to their needs) and would, in effect, “rent: the use of the lines to service their destinations. School bus units may be higher capacity and have somewhat less comfortable seats, for example. In return, the cab owners can use their gondolas as billboard space.

- **Local Governmental Ownership** – At present it seems unlikely that the Town of Truckee or either Placer or Nevada County could (or would) afford the tramway system (or would want the burdens of ownership). However, in light of the fact that these governments now dedicate large portions of their current budgets to road maintenance, snow plowing, bus subsidies, policing, etc., they are really funding car-based transit. They may want to evolve into a tramway system ownership role if the system’s costs of moving people are attractively lower and people are safer and it helps the region meet pollution reduction goals. The regional importance of having an eco-sensitive, cohesive transportation system in place may, in the end, involve state or even federal participation. There might be Lake Tahoe and Truckee Rivers erosion control dollars available for this project. There also may soon be and pollution or carbon offset dollars available.

- **Federal Funding** – Pending the details of the current stimulus plan and other government programs, there could be small scale mass transit development dollars.


  http://www.fta.dot.gov/planning/planning_environment_8510.html

  http://www.fta.dot.gov/grants_financing.html

  http://www.fedmoney.com/grants/20505.htm

  http://www.fedmoney.com/grants/20512.htm

- **Private Equity Capital** -- Another scenario would rely on one or more deep pocket developers who see the long term value of integrating the transit in the entire region, making it more accessible for local and international recreational tourists than almost any area in the U.S. This may be part of a plan to have the Tahoe area host the Winter Olympics, for example.

- **The Public Ownership “Passes As Stock” Model** -- Another scenario is that area long term individual and corporate users would in effect invest in the system by purchasing enough long term passes to partially capitalize the system and then attract other investors, float a public bond or other strategy.
Operating Entity Business Models

In addition to needing the cooperation of these government and NGO stakeholders and controlling entities, the system will need an “operating entity” that follows the guidelines of some responsible transit system governing body. Any operating entity must also have security staff and procedures and interface with regional law enforcement in place as well.

- The first choice might be to extend the charter of TART or an existing transportation franchise (if they were willing to expand beyond bus service) and have them staff and maintain the system.
- Another possibility would be to have a private contractor run the system on a small for profit basis.
- Yet another alternative, with the most paperwork would be to form a new regional – cross county transit authority with its own staff and facilities.
- Ideally, which almost never happens, each major user group in the system would partially fund the operations by subscription – based on ridership. For example, each ski resort, school, tour group, or neighborhood association served by the system would purchase a bulk quantity of passes and could perhaps purchase and resell partial ownership of the lines – as long as they remained inalienable from the rest of the system.

Governing Entities

This system when built will be governed by a host of federal, state, and local regulatory agencies. In addition, the system must conform to the environmental operating constraints of the TRPA and the Lahontan Water Quality Board, for example.

Conclusion – We Should Be “There” By Now

Doing nothing is not an option. Our society is facing need to fundamentally change how we conduct “business as usual” in terms of energy use and environmental sustainability. There will never be the “best time” or “enough money” to tackle these issues, but “now” is all we have. We can’t plan for and provide for the future “later.” In a sense we tell each other the story of the frog in the slowly boiling water, never believing that it is our water.

There is no one “solution” to our energy and transportation problems. At best, this proposed tram system may be only a 20-35% solution to our transit needs, but even that would represent a significant reduction in oil used, pollution emitted, and lives damaged or lost due to road accidents.

My idea for a safe, convenient regional system may not be everybody’s cup of tea. I’d love to keep my red sports car forever too. Many car- and road-based trips will still be needed and those, for example, with a fear of heights my not want to ride the system – even though the average height will be only about 50 feet.

Please remember, that this is not about you and me and our immediate transportation needs – it’s about what is good for the next two generations. Perhaps after that the long-awaited energy solutions based on fusion, “renewable energy,” or “clean” coal will come on-line. We are facing a situation of “death by a 1000 paper cuts” in terms of gas costs, pollution, and global warming. In turn, we need to devise thousands of small-scale solutions that are tailored to address our local needs rather than rely on having massive single source, one-size-fits-all solutions.

One of the only sure things is that we will be judged and held accountable for
our actions and yes – maybe even more for our “in-actions” in the face of the need to change. One of the points of this proposal is to make sure that we, the frogs, know when it’s time to jump out of the boiling water (and to have a safe place to land) before we end up as frog soup.

*This system – or one that satisfies the requirements to move people cheaply at low risk and with a low carbon footprint – needs to be built soon. This aerial tramway system could be engineered, designed, and made “shovel ready” in a few years and built within the decade – in time to make a difference for this and future generations.*

Section IV - Supporting Materials

**Needs Basis - Cars and Their True Costs**

Some Background Transit Data

Determining the possible fuel savings and carbon offsets from the use of the tram system is based to an extent on how we currently use personal vehicles. The following data shows the use of cars for various types and lengths of trips. The data shows that we use our cars mostly for short trips that could be accommodated by this tram network. The aggregate of the environmental, economic, and social impacts of these trips made in cars (with low ridership) contributes to the high carbon footprint of the auto-based modes of travel. The energy consumption, the costs to build, maintain, and plow roads, the pollution generated, and even the injury-related medical costs associated with car travel would be at least party offset by the tram system. This value of this “offset” number would depend on ridership and car trips avoided, as well as other revenue and cost factors.

While the system would reduce local auto pollution, the energy has to come from somewhere. Most likely the most accessible current sources would be coal and gas fired power plants – essentially off-loading the carbon footprint to the East. The tram system should result in potentially enough carbon savings compared to the equivalent car usage to justify the system cost. Eventually, the system could purchase “greener” sources of power. In the mean time, the carbon offsets generated by the system could possibly be sold.

Comparison Data

Part of the cost/benefit study will determine the comparative costs of tramway vs. roadway costs. These comparisons will include the entire life cycle costs per mile of a tramway line and paved roads. These combined costs must include: land costs, construction costs (for various grade difficulties), maintenance costs, snow removal costs, and life expectancy and replacement costs. Total costs, of course, depend on where you are and factors such as variations in land values and costs, people or businesses to relocate, and environmental mitigation needs. These needs may arise from construction (such as for noise walls for neighbors) and storm water cleaning for streams and wetlands. Costs also depend on the elements in the project - are we just building a road, or are new bridges or interchanges also included? Below is a sampling of various recent projects and their costs in Seattle, WA.

<table>
<thead>
<tr>
<th>Route</th>
<th>Work Performed</th>
<th>Cost Per Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 18</td>
<td>Widening in rural King County</td>
<td>~$24.5 million per mile.</td>
</tr>
<tr>
<td>US 12</td>
<td>Widening south of Tri Cities</td>
<td>~$3.7 million per mile.</td>
</tr>
<tr>
<td>I-5</td>
<td>Widening in Vancouver</td>
<td>~$20.2 million per mile.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>~$1 million per mile.</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>I-5 Truck</td>
<td>Truck climbing lanes east of Cle</td>
<td>~$7 million per mile.</td>
</tr>
<tr>
<td></td>
<td>Elum and at Vantage</td>
<td></td>
</tr>
<tr>
<td>ler lanes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-5 HOV</td>
<td>HOV lanes from Tukwila to Fife</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These costs are for construction only and do not include costs for engineering and design and for a widely-varying factor, land acquisition costs.
Sources: http://seattletimes.nwsource.com/html/localnews/2003469356_highways09m.html

**Average Automobile Usage**

In addition to the road-related costs, another component of the cost of current transit practices is the total cost of ownership for personal automobiles. This cost is borne by the aggregate of individual car owners (and is itself an aggregate value). This cost is hard to quantify, but several considerations must be taken into account. According to a 2009 study conducted by the AAA, the total per mile costs of automobile ownership is a combination to fuel, tires, maintenance, taxes, depreciation, and other factors. Multiply these yearly values times the roughly 30 years of car ownership times the millions of vehicles in the state and you begin to appreciate the ongoing personal investment in a car-based system that needs viable alternatives soon.

**Table 10 - Automobile Use Yearly Costs**

<table>
<thead>
<tr>
<th>Type</th>
<th>Operating Costs Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Sedan</td>
<td>$6,312</td>
</tr>
<tr>
<td>Medium Sedan</td>
<td>$8,104</td>
</tr>
<tr>
<td>Minivan</td>
<td>$8,815</td>
</tr>
<tr>
<td>Large Sedan</td>
<td>$9,870</td>
</tr>
<tr>
<td>SUV</td>
<td>$10,200</td>
</tr>
</tbody>
</table>

As another example based on the writer’s personal experience, the following table attempts to estimate the 20-year cycle costs for some factors and to point out the hidden costs embedded in other factors.

<table>
<thead>
<tr>
<th>Autos Purchased</th>
<th>Insurance</th>
<th>Gasoline</th>
<th>Repairs</th>
<th>Highway Taxes</th>
<th>Personal Injury</th>
<th>Share of Other’s Injury</th>
<th>Carbon Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100,000 (5 $20K autos in a 20 period)</td>
<td>$40,000 ($2K per year for 20 years)</td>
<td>$31,200 ($35.00 per week for 20 years)</td>
<td>$20,000 ($1K per year for 20 years)</td>
<td>Unknown but not insignificant (paid via gas tax and your share of Federal and State)</td>
<td>Range from $0.00 to $100,000 per person over 20 years</td>
<td>Your best guess as to your own portion of your high medical and insurance</td>
<td>$1374.00 from 55,879 lbs. CO₂ (basis: 5 Ford cars – Tempos and Taurus models)</td>
</tr>
</tbody>
</table>
taxes used for roads) of loved ones. costs. driven 60,000 miles – 12K per year of 5 year service life)

Table 11 - Auto Life Cycle Costs

The following tables show automobile usage patterns. According to these patterns the 15 mile radius of the Tram system’s main lines would accommodate 87.5% of the needs of the travelling public. Even if our rural area “stretches” these national average distances – there are potentially huge savings from using the system. The table shows that 91.8% of the Annual Trips made are less than 20 miles in length and that 52.7% of the Annual Miles travelled are less than 20 miles as well.

<table>
<thead>
<tr>
<th>Trip Length</th>
<th>% of Annual Trips</th>
<th>% of Annual Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 5 Miles</td>
<td>54.1</td>
<td>11.1</td>
</tr>
<tr>
<td>5-9</td>
<td>19.6</td>
<td>13.8</td>
</tr>
<tr>
<td>10-15</td>
<td>13.8</td>
<td>18.7</td>
</tr>
<tr>
<td>16-20</td>
<td>4.3</td>
<td>9.1</td>
</tr>
<tr>
<td>21-30</td>
<td>4.0</td>
<td>11.8</td>
</tr>
<tr>
<td>31.40</td>
<td>1.6</td>
<td>6.6</td>
</tr>
<tr>
<td>41-50</td>
<td>0.8</td>
<td>4.3</td>
</tr>
<tr>
<td>51-99</td>
<td>1.0</td>
<td>7.6</td>
</tr>
<tr>
<td>100+</td>
<td>0.8</td>
<td>17.0</td>
</tr>
</tbody>
</table>

Table 12 - Automobile Usage Patterns

The following data was pulled from a U.S. Federal Highway Administration study – the “National Transportation Survey – Summary of Travel Trends 1969, 1977, 1983, 1990, and 1995.” The “take away lesson” from this table is that there has been a huge increase in two and three vehicle families since 1969 – a trend that might not be sustainable – for the most part to make short hops at high speed.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicles per Household</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Vehicle</td>
<td>1000</td>
<td>12876</td>
<td>11538</td>
<td>11548</td>
<td>8573</td>
<td>7989</td>
<td>-33%</td>
<td>-33%</td>
</tr>
<tr>
<td>One Vehicle</td>
<td>1000</td>
<td>30252</td>
<td>26092</td>
<td>28780</td>
<td>30654</td>
<td>32064</td>
<td>1.0%</td>
<td>6%</td>
</tr>
</tbody>
</table>
### Table 13 - Vehicles Per Household

This table shows the steady increase in the Daily Vehicle Trips Per Household and that the Average Vehicle Trip Length has stayed fairly steady at under 10 miles.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Vehicles</td>
<td>1000</td>
<td>16501</td>
<td>25942</td>
<td>28632</td>
<td>35872</td>
<td>40024</td>
<td>117%</td>
<td>142%</td>
</tr>
<tr>
<td>Three of More Vehicles</td>
<td>1000</td>
<td>2875</td>
<td>11840</td>
<td>16411</td>
<td>18248</td>
<td>18914</td>
<td>535%</td>
<td>557.9%</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>1000</td>
<td>72500</td>
<td>120098</td>
<td>143714</td>
<td>164221</td>
<td>176067</td>
<td>128%</td>
<td>142.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Vehicle Trips Per Household</td>
<td></td>
<td>3.83</td>
<td>3.95</td>
<td>4.07</td>
<td>4.66</td>
<td>6.36</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Daily Vehicle Miles Trips Per Driver</td>
<td></td>
<td>20.64</td>
<td>19.49</td>
<td>18.68</td>
<td>23.69</td>
<td>32.14</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Average Vehicle Trip Length</td>
<td></td>
<td>8.89</td>
<td>8.34</td>
<td>7.90</td>
<td>8.87</td>
<td>9.06</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Average Annual Vehicle Mile Trips</td>
<td></td>
<td>12,423</td>
<td>12036</td>
<td>11739</td>
<td>15100</td>
<td>20895</td>
<td>22%</td>
<td>NA</td>
</tr>
<tr>
<td>Home to Work</td>
<td></td>
<td>4183</td>
<td>3815</td>
<td>3538</td>
<td>4853</td>
<td>6492</td>
<td>16%</td>
<td>NA</td>
</tr>
<tr>
<td>Shopping</td>
<td></td>
<td>929</td>
<td>1336</td>
<td>1567</td>
<td>1743</td>
<td>2807</td>
<td>88%</td>
<td>NA</td>
</tr>
<tr>
<td>Other Family / Personal Bus.</td>
<td></td>
<td>1270</td>
<td>1444</td>
<td>1816</td>
<td>3014</td>
<td>4307</td>
<td>137%</td>
<td>NA</td>
</tr>
<tr>
<td>Social &amp; Recreational</td>
<td></td>
<td>4094</td>
<td>3286</td>
<td>3534</td>
<td>4060</td>
<td>4764</td>
<td>-1%</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Table 14 - Vehicle Trip Lengths**
Budgets and Funding Sources

The Baseline - Existing System Construction and Operating Costs

The total cost for this tramway and station project could be between $500-750 million dollars assuming roughly 45 to 50 miles of tramway line and the need for main stations, way-stations, and other infrastructure costs.

The sample systems listed in this proposal show a cost of between $6.4M and $91M per mile of line. This system will be much closer to the lower end of this range due to several factors: low elevation gains, for the most part “road accessible” tower locations, little transit over populated areas, and some economy of scale in construction and materials and equipment costs. The Hercules study shows a construction cost per mile of $18 million per mile for single wire gondola systems. Telluride spent about $16 million on their system. That was about $5-6 million/mile compared to light rail costs of around $50 million per mile.

A 1992 paper for the transportation research board estimated that a one-mile detachable gondola system costs $5 to $9M. Reversible systems can be much more expensive due to larger terminals and massive machinery needed to haul larger cabins. One feasibility study in 1980 showed that a 4,000 foot (3/4 mile) reversible ropeway in Detroit would cost over $10 million ($26.7 million in 2006 dollars).

Some estimates can be established based on the construction costs of systems actually built or studied in the recent past. Systems in California, Colorado, and Oregon can be used, for examples of existing cable systems. The monorail line in Las Vegas or the San Jose Light Rail System could be used as another baseline for fixed rail systems. The link below shows some 2006 data and estimates:


Construction Cost Estimates
## Squaw Valley, California – Actual System

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>2009 Value</th>
<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5.5M ($14M / Mile)</td>
<td>$33.5M</td>
<td>.38 Mile</td>
<td>1968</td>
<td>120 person capacity</td>
</tr>
</tbody>
</table>

### Yearly Operating Costs

<table>
<thead>
<tr>
<th>Yearly Operating Costs</th>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under Study</td>
<td>Under Study</td>
<td>Under Study</td>
<td>$16-29</td>
<td></td>
</tr>
</tbody>
</table>

## Telluride, Colorado – Actual System

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>2009 Value</th>
<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$16M ($6.4M / Mile)</td>
<td>$21.6M</td>
<td>2.5</td>
<td>1996</td>
<td>32 – 8 Passenger Cars</td>
</tr>
</tbody>
</table>

### Yearly Operating Costs

<table>
<thead>
<tr>
<th>Yearly Operating Costs</th>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3.5M</td>
<td>Under Study</td>
<td>Under Study</td>
<td>Free</td>
<td></td>
</tr>
</tbody>
</table>

## Roosevelt Island – Actual System

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>2009 Value</th>
<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$20M ($33M / Mile)</td>
<td>$74.5M</td>
<td>0.6</td>
<td>1976</td>
<td>2 Cars - 125 People/Car</td>
</tr>
</tbody>
</table>

### Yearly Operating Costs

<table>
<thead>
<tr>
<th>Yearly Operating Costs</th>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under Study</td>
<td>Under Study</td>
<td>Under Study</td>
<td>$3</td>
<td></td>
</tr>
</tbody>
</table>
Portland, Oregon – Actual System

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>2009 Value</th>
<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$57 M ($91.2M / Mile)</td>
<td>$60.5M</td>
<td>5/8 (3,300 Feet)</td>
<td>2006</td>
<td>Projected at $15 M</td>
</tr>
</tbody>
</table>

Yearly Operating Costs

<table>
<thead>
<tr>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7 M</td>
<td>1.5 M</td>
<td>$1.81</td>
<td>$4.00</td>
</tr>
</tbody>
</table>

Palm Springs, California – Actual System

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>2009 Value</th>
<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3M</td>
<td>$21.2M</td>
<td>2.5 Miles</td>
<td>1962</td>
<td>12 Million Passengers Carried</td>
</tr>
</tbody>
</table>

Yearly Operating Costs

<table>
<thead>
<tr>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under Study</td>
<td>Under Study</td>
<td>Under Study</td>
<td>$15.00-22.00</td>
</tr>
</tbody>
</table>

Project Budgets

The proposed project will require several phases, each with its own budget and funding cycle. See the links on this page for the budget projections for each of the project components listed below. Note that the actual budget figures for these links are under study and will be completed with the aid of a top-tier local construction management firm specializing in high altitude construction projects.
The Needs Analysis Budget

The first phase will be the formal needs analysis and feasibility study. “Preliminary Budget A” attempts to itemize the major cost centers of this phase.

**Budget A - Needs Analysis**

http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdExtUWlnNVAYm5pYm9YR1hpRXVFTWc&hl=en

Initial Design and Engineering Budget

“Preliminary Budget B” covers the initial system design and engineering including a “breakout” budget for the cost of developing any new technologies

**Budget B - Design & Engineering**

http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdC1xVXVLFhTaWJLMXNsME9xLWtGNUE&hl=en

Initial Construction Budget

"Preliminary Budget C" shows the overview of the Construction Budget. Subsequent Component Budgets detail the projected construction costs of the initial system’s diverse elements.

**Budget C - Overall Construction**

http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdHZRVWNJTEx5cHpKRy05VklpWDU4Znc&hl=en
**Stations**

The system will be comprised of a set of stations of various sizes and complexities. “Preliminary Budget D” details these cost estimates.

[Budget D - The Stations](http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdFhwTFBjZmFfZ2hJSklDTVRteVJ1b1E&hl=en)

**Rights of Way Acquisition & Leasing**

A large initial and on-going system cost component will be the fees to purchase and lease rights of way for towers, lines, and access roads. “Preliminary Budget E” details the projected costs.

[Budget E - Rights of Way](http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdGVyTVRDNHNhTG11bHImVXVUT0d5SXc&hl=en)

**Towers**

One of the largest variables in this system will be determined by the decision to either use existing designs for steel pole type towers, or whether to use larger, more costly concrete towers that could be used in later phase to support a monorail guide-way, for power transmission, or for cell towers, for example. Concrete towers with moisture intrusion prevention may provide better survivability in fires or earthquakes and may resist ice jacking and wind shear better than tubular steel towers in which one dent or crack in the skin can weaken the entire tower. “Preliminary Budget F” details these cost factors.

[Budget F - Towers](http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdDRiM0pwYmQ2bnRmSnVWRFA2dXVxV0E&hl=en)

**Cables**

The system will require up to 150 miles of cable with a provision for replacement in the capital costs. “Preliminary Budget G” details estimated cable costs.

[Budget G - Cables](http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdEhhMi1VWGw4d19ESE9CMF9hdUZfa3c&hl=en)

**Gondolas**

The system will require somewhat around 350 gondolas to span the line’s 45 miles. “Preliminary Budget H” details estimated gondola costs.

[Budget H - Gondolas](http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdFowV0wxc2w4VG0yb0YxbjZjRng5MHc&hl=en)
Service Facilities / Maintenance Barn

The number of gondolas and spares required will require a large storage space as they come off line in low demand cycles. There must also be facilities to clean and maintain and to recondition gondolas. “Preliminary Budget I” details estimated maintenance facilities costs.

Budget I - Services Facilities
http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdDk4aWpVT3dKYkVWNjRMbTdBXzdQdFE&hl=en

Parking Structures

The number of open air and covered parking spaces is perhaps the largest land use issue other than the line right of way. Sales of parking stalls will also be an important income stream. “Preliminary Budget J” details estimated parking costs.

Budget J - Parking Structures
http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdFgyWUVLUZlcG4wSmpzcjZrS2wtWGc&hl=en

Auxiliary Power System

The initial power loads for starting the system (and the need for emergency / power outage operations capabilities) will require an auxiliary power source. “Preliminary Budget K” details estimated power facilities costs.

Budget K - Auxiliary Facilities
http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdFNuemJ0Y1h2QVR1a0RZSVpCOVZvdmc&hl=en

Inter-modal Link Facilities

The tram system will need intermodal connections at many of its stations to inter-tie to the local TART bus system, the railroad, the local airports, and recreational sites. These stations will need some baggage handling, storage areas and baggage forwarding systems. Some stations will have vendor booths and other special services such as, bike lockers, rental vehicles, and even shower and locker rooms for sports users or concierge / valet services to serve up-scale area resorts. “Preliminary Budget L” details estimated Inter-modal facilities costs.

Budget L - Intermodal Link Facilities
http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdE1rR3gwQVNZTFNBDJDcFRuNnhnZkE&hl=en

Communications & Data Infrastructures

The system will require state of the art communications and IT infrastructures both internally for the system’s use and externally for user’s “Wi-Fi” access. “Preliminary Budget M” details estimated Communications and IT facilities costs.

Budget M – Comm. & Data
http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdGxZOWNjVI9XTWoxWk9RQ2V6MVZscUE&hl=en
Security & Emergency Systems & Vehicles

The system will need security and emergency evacuation protocols and systems, staffing, and facilities as well as a small fleet of snow cats, snow mobiles, and other equipment. “Preliminary Budget N” details estimated emergency facilities costs.

Budget N - Security & Emergency Facilities

http://spreadsheets.google.com/ccc?key=0Ak7oidP0JFDXdDBqNjdFREpjSHdoQ0xHZGpIa19qTVE&hl=en

Operating and Long Term Capital Costs

The operating and long term capital replacement costs are covered in “Preliminary Budget D.”

An initial contact has been made with the operators of the Squaw Valley system and the system at the San Diego Zoo to determine their costs per rider or other applicable metric derived from their long history of operations.

An equivalent might be derived from a report on Portland’s aerial tram which carried 125,158 people in February, nearly twice the anticipated 66,000 trips. The tram connects the Oregon Health Sciences University (OHSU) hospital with medical offices and clinics.

Figure 28 - The Portland System

The $32,736 in revenue won’t go very far towards the operating costs, which are projected to be nearly $150,000 a month. Some in Portland complained that the $4.00 fare made it so that only the well-paid workers at the clinic could use it. Other critics noted that “off-the-shelf” gondolas would have saved the system a considerable sum.

Potential Construction & Operating Cost Offsets

There may be “pay-back” funding from some of the various shared cost savings or post construction revenue streams. Possible cost offsets would arise from:

- **Reduced Road Use Costs** – The local, county, state, and federal governments could spend less on road maintenance (less chained-tire wear and tear, less snow removal and sanding). There would also be less tire and oil run-off and accident-related plastic and metal “leftovers” pollution. In addition there would be far less gas used and tailpipe pollution emissions to mitigate.

- **Less Long Range Road Building and Maintenance** – These same public entities would need less asphalt, less labor, and have lower land use costs.

- **Increased Tax Revenues** - The potential for increased area-wide economic vitality would help keep Truckee-Tahoe “the” major California destination resort – possibly increasing sales tax revenues, hotel tax, and more jobs for locals to build and run the lines and related businesses.

- **Advertising Revenues** – Sales of ads on the gondolas and at the stations would generate some revenue.
• **Internet & Cell Access Sales** - Cell and Wi-Fi rights on the towers and use fees could be revenue positive.

• **Utility Co-Use** – The TDPUD’s power and cable lines could be strung on upper branches of towers and be part of the cost structure in terms of infrastructure financing and maintenance.

• **Freight Revenue** - The potential to use the system in off hours for inter-city freight might generate additional revenue.

• **School Bus Cost Offsets** - The local school district could avoid the costs of running some of their bus fleet. Currently the district spends $6.92 per mile to transport students. However, the school district’s buses travel over 400,000 miles per year – totaling $2,768,000.

• **Medical Offsets** - There might be a reduction in road-related injuries and the associated local human and material costs.

---

**References to Other Systems**

**The Gondola Project**

The Creative Urban Projects group documents the various projects in operation or under construction in the world.

The Gondola Project

**Hercules, California – Proposed**

[www.reconnectingamerica.org/public/download/aerialtram](http://www.reconnectingamerica.org/public/download/aerialtram)
Ogden, UT

http://archive.ogdencity.com/displayarticle50.html

Whistler, Canada

http://ww1.whistlerblackcomb.com/p2pg/

Skyscrape


Below are some comments from this source:

They (Trams) work really well in Ski resorts (some of the densest and highest traffic areas around) and some are actually building them across large swaths of the town allowing people on the far side of town to be quickly whisked to the mountain top.

... Telluride has a gondola that takes people from an area called Mountain Village to the town of Telluride. The trip is roughly 3 miles and takes 12 minutes to travel to the full length, and you have the option of stopping midway at a transfer station to get to another area of development. The gondolas can comfortably hold four people and are completely enclosed thereby protecting passengers from the elements. These gondolas also slow down to a creeping speed at the stations facilitating easy transfer on/off. I have also heard that there are plans to use a similar (but possible faster) gondola system to connect Breckenridge and Vail.

A system like this in mid-sized cities would be a phenomenal way to travel! Here are some
pros to establishing a mass-transit system like this:

1. Much cheaper development costs than light rail. Telluride spent about $16 million on theirs. That’s $5-6 million/mile compared to light rail costs of ~$50 million per mile.

2. Land acquisition is much less of an issue since current right-of-way could be used. The gondolas could actually travel directly above traffic with support pillars in the medians or adjacent to the roads.

3. Immediate service. Gondolas come into the station every 30-60 seconds. Missing a bus or train is incredibly annoying when you have to wait another 10 or 15 minutes (at best) for the next one.

4. Increased capacity compared to bus routes or light rail.

5. Quick time-frame for construction. Time-frame of months instead of years.

6. All electric. Could be coupled to solar or wind.

7. Scenic views. The viewpoint from these would be second-to-none.

8. The ability to run these routes over existing right-of-way would enable planners to build routes that are most demanded instead of having to settle for which routes would be most feasible cost-wise.

9. Building an entire system would yield benefits that are more than the sum of the individual parts (5 interconnected lines will bring more passengers than 5 individual lines). This is something that no city has been able to do with light rail.

The Proposed Burnaby Mountain System

Burnaby Mountain could soon have a gondola line serving Simon Fraser University and the rapidly-growing community of UniverCity. The SFU Community Trust has put forward the concept of an estimated $68.9 million project that would run between the Production Way SkyTrain station and the transit loop at the east end of the SFU campus. Trust CEO Gordon Harris said a gondola transit system would improve reliability and travel times to and from Burnaby Mountain, and reduce the greenhouse gas emissions currently produced by the fleet of diesel buses that run up and down the mountain.

Figure 29 - The Proposed Burnaby Mtn. System

Travel time from Production Way to the current transit loop would be 6 minutes - not the 14 (minimum) it takes by bus. Operating cost is around half that of buses - and the capital cost is not much more than the $50m it will cost for a replacement fleet of buses. Ridership is currently around 20,000 a day. Obviously it will be much better if the gondola is integrated into the Translink fare system than run privately. One major advantage of the aerial tramway is that it can operate in snow and not leave people stranded on the mountain top.
Other Considerations

Wind Factors

Gondolas can operate in winds up to 50 miles per hour and three cable systems may be able to handle even higher winds (although at reduced line speeds). Winds above 50 mph may cause the gondola to be closed. Perhaps a few customers will be inconvenienced by these closures due to the fact that demand for skiing and sightseeing is lower on windy days.

A Truckee resident with a wind turbine reports fewer than 10 estimated days per year with sustained 35 mile per hour winds. A low tower height system would limit wind exposure to an extent. On days where high winds cause operations to be suspended, the neighborhood shuttle system (that normally loops within the various areas to feed the tram) would go into “long haul mode” to service the stations directly. On those days where riders are in-transit when the system shuts down due to wind, the riders will be delivered to the nearest station at a reduced speed, and then taken to their destination via shuttle bus. Projected prolonged periods of high wind may require additional leased shuttle capacity. The proposed design has concrete, steel reinforced towers with multiple legs to offer more wind stability.

Gondola Climate Control

The system should provide for enough space heating to keep the cabs above 50 degrees. Natural air-flow draft will provide for cooling in the summer. No windows will open – so no trash should be thrown out.

Privacy Concerns / NIMBY

For the most part routes will follow existing utility rights of way or back routes (across the river from the highway 89, along the legacy foot trail to Glenshire, etc.) and privacy will be protected with the gondola averaging 40 feet above ground level. From that height, riders will be looking at trees and rooftops. The Ogden group has pictures that show what the view is like along the route from that height.

The resistance to the proposed “new route” into Tahoe Donner may show that the NIMBY factor applies the needed additions to surface streets if we intend to accommodate future growth.

Safety Factors

- **Rescue / Evacuation** – I propose that the gondolas have tube-chute systems or deployable rope ladders with some means, such as a sling and winch system, for evacuating the handicapped or infirm.
- **Fire** – there should be on board smoke detectors and extinguishers.
- **Power Outage** – separate diesel motor driven winch and motor system to retrieve “stranded” gondolas using the third cable at low speed.
- **Wind Emergency** – Have gondola ballast system to fill the base with sand or weights to stabilize in moderate winds. Have high wind / sheer wind warning system that would either slow or lock the system and trigger controlled or emergency evacuation plans.
- **Public Safety** – some policing of the major stations and way stations would be required, but the gondolas would be almost small group-private and would have web cams to record emergencies or passenger misconduct. No cab is more than 10 minutes from a station where system security and/or local police could be involved – if needed. This system could be used a supplemental means to evacuate locals and visitors the area if roads are closed or choked with traffic or even to deliver emergency crews and supplies into the area.
It may be possible to create a spring tension winch system within each gondola boom that could be released by emergency handle or remote control that would lower the gondola slowly to the ground for evacuation. Once passengers were offloaded, the gondola would retract up to re-attach the boom to the shuttle and wire.

![Gondola Emergency Evacuation System](image)

**Figure 30 - Gondola Emergency Evacuation System**

### Local Right of Way and Land Use Issues

Wherever possible, existing rights of way should be used for the tram system. In places the routes might hug the hillsides to stay away from the Truckee River and existing housing.

### Pollution Factors and Offsets

Visual and noise pollution studies should be conducted when the lines will run near residential areas. Towers and lines should be located in existing power corridors or “back side of the ridge” routes whenever possible.

**Visual Pollution**

Some opponents of the proposed system may claim that the towers, stations, lines, and gondolas of the system would be a form of visual pollution. This may be true to an extent. For every gain made with a technology, there is often something lost. To be fair, the reader must compare the system’s towers every ¼ mile to the existing visual pollution we all “black out” when we don’t notice the power poles and wires, the street signs, the roadside debris, and even the wide swath of blacktop that forms a road (which would have been considered “ugly” visual pollution 100 years ago).

**Noise Pollution**

It is true that the operations of the gondolas motors and guide wires and pulleys will generate a constant hum (and occasional wind noise), but the total noise generated per passenger mile must also be compared to that generated by the cars and trucks that would otherwise be taking one or two passengers to the same destinations.

**Debris Pollution / Ice Fall Concerns**

The accumulation of ice on the towers and pulley systems (and the occasional loss of a nut or bolt) will require that catch basins be installed under towers to prevent large ice blocks, debris, grease, ice, etc. from reaching the tower base or fall on residential or pedestrian areas.
Some Counter Arguments to Tram Systems

The following link present many valid counter-arguments to the proposed benefits claimed by the proponents of personal light rail vehicles.

http://www.lightrailnow.org/facts/fa_prt001.htm

From the Skyscraper Link

"Maybe at Disneyland, but not in the real world."
1. Air space would be taken over, preventing construction of high rises.
2. Unable to branch out.
3. Would require tall buildings just for stations, so costs approach those for elevated rail.
4. NIMBYs would object to the lost privacy (since no one likes to see people floating outside the apartment window).
5. It's proprietary technology: once you build it you're stuck with the same company that's free to raise prices.
6. Capacity: if each car carries 10 and a car comes every 30 seconds, capacity is 1200 pphd, lower than an average bus.

Local Reviewer Counter Arguments

Reviewer A

"Thanks for the article which I found really interesting…I feel that the need to develop some type of transportation plan is important. However I do not feel that this type of approach is feasible for the following reasons:

1. The need for individual flexible modes of transport is first and foremost. The fixed routes of such a system imply that one still has to use a car to get to the set up hubs, so roads are still a necessity. Perhaps having 2 systems in parallel is redundant

2. Most peak traffic is generated from Sacramento and San Francisco. I think traveling families would not like to repeat the loading and unloading process (once for the car and once for the gondola). They usually arrive with food and lots of sports equipment.

3. I do not see storage as feasible. It is difficult to administer and does not provide sufficient flexibility to people.

4. Gondola travelers with large loads (groceries etc) would not want to walk from the hub to their destination home. This would be even harder in the winter.

5. Overall costs (capital expenditure + operating) of a gondola versus the current road system would need to be carefully analyzed. There are so many planning costs associated with a project of this size."
6. I have ridden the Telluride gondola. As far as I remember it did not run parallel to homes and is therefore aesthetically acceptable.

7. I feel that a gondola would only work if you wanted to connect a small town right at the base of the mountain to the top of the mountain (e.g. Telluride). Its feasibility for general transport is limited due to lack of flexibility.

8. Operating costs could be high – power failures are an issue. High winds are probable and problematic.

If I let my mind free, I feel that hovercraft cars (fuel efficient) would work well. They would travel above the snow and therefore snow plowing could be eliminated. This is a far fetched idea as the cost of snow plowing is so minimal in comparison to arriving at a hovercraft!!!

I think it is better to work with the existing infrastructure. Fuel efficient cars and better buses may be a step in the right direction. I think oil will be around beyond 20 years but even so some nascent planning is necessary.

Reviewer B

We did look at your first paper and I just looked at your revision. Personally to be honest (and what are friends for?) my reaction to the proposal was really wondering if it was a satire. Then when I saw you were serious, I read it from feasibility and cost analysis standpoint. I didn't see any real cost analysis in the first paper and I only see reference to cost savings in the second paper with no analysis of investment, operational or maintenance costs.

Besides the feasibility that might influence me if I thought it was a 'bang for the buck' solution to a problem both from environmental and cost standpoint, my gut reaction is socially I can't imagine the interest of the typical resident or visitor being interested in using this mode of transportation. The current public transportation is so under utilized. I agree with the argument that this system may be cost effective for concentrated movement of people in a very small area but not for widespread transportation system. I also can't imagine that the environmental impact alone wouldn't shut this down.

I think your passion is great but I don't agree with this one at all. You're definitely someone who likes to take an idea and run. If I can ever think of something clever that I'd like to implement I'll definitely know who to go to!

Are you getting support from people on this idea?

Reviewer C

“I think America would have to be “on its knees” before people would give up the convenience of driving their own cars.”

Reviewer D

“I would not like to look up at the lines and tower. However, I would like a regular rail service to Reno from Truckee.”
Dear SanDag Transportation Committee

My name is Jeff Sparksworthy and I have long been an advocate for mass transit, active transportation, and related alternative transportation systems and infrastructures. Towards this end I have been developing a proposal to help further the region’s use of the trolley system to help meet SanDag’s ambitious goals. The trolley is the current core of the mass transit system, but one that only serves narrow, commercial area-focused corridors. The bus system has some interties to the trolley system, but these two systems do not fully address the needs to get people in a timely and direct fashion from the dispersed residential areas to the trolley stations. Nor do these systems address the ridership needs to get tourists from the airport to the zoo, Balboa Parks, or our beach areas.

The system intertie that I am proposing is based on the use of high speed aerial gondolas to feed riders from currently underserved residential and commercial areas to the trolley system. Please consider allotting me some time (15-20 minutes) at a future public meeting to introduce this concept to see if it has been considered in the past or would possibly be considered in the near future. Or, I’d be happy to have a brief staff meeting if the public forum is not the best way to introduce the concept. Many major cities in the world are adopting these types of systems to overcome the obstacles to mass transit represented by high costs per mile, rights of way issues, high operational costs, etc. (see www.gondolaproject.com).

Please review the attached draft proposal to see if your group would like to consider this type of transit solution. I am looking forward to hearing from you.

Cheers,

Jeff Sparksworthy
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San Diego, CA 92111
jsparksworthy@gmail.com
530 386-4275
“A Subway in the Sky”

A Proposal for an Aerial Tramway Based Regional Public Transportation Network

Submitted by:
Jeff Sparksworthy
6645 Canyon Rim Row, #195
San Diego, CA, 92111

Date: 4/3/2019
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Some Notes to Readers

This document is a discussion of the San Diego Region’s need for a modern public transportation system to supplement and tie together the current surface-based system followed by a proposal for the type of system needed to create an integrated, area-wide transit solution.

The initial proposal is being created by Jeff Sparksworthy, a local advocate for alternative transportation, who foresees the creation of a system that bypasses the need to create and maintain more roads that service cars that burn ever decreasing reserves of fossil fuel. The writer has no direct personal gain-based motivation for creating this proposal. The goal rather is to help start and push forward the discussion about long-range regional transportation needs and ways to meet them, and hopefully to start the process of turning the proposed concept into a reality.

We are, as a society acting, rather like the proverbial frog sitting in the water as it comes to a boil. For over thirty years, we have known that our behaviors in terms of energy use and pollution emissions are both economically and environmentally unsustainable. Even though the prospect of global warming has become grudgingly accepted by some (if not all), we still send our national treasure and now our best and brightest young people into harm’s way to keep the oil flowing. We should have been focused on national and local solutions decades ago. Now according to climate scientists, we face these problems with a new urgency. Even as more domestic oil “reserves” have recently become available, we should lower our carbon emissions anyway. We use about 30% of the oil imported for transportation. Increasing vehicle fuel efficiencies does not solve the problem, it only allows us to have more cars and continue our destructive patterns until all we have is “frog soup.” Spending scarce resources on any further developments and improvements to our existing street and highway systems is, in a sense, spending money we do not have to perpetuate a system that is failing us.

The Need for Alternative Regional Transit

Offering adequate and environmentally friendly access to the region’s many recreational, employment, and educational opportunities is vital to the long term health of the greater San Diego Region. The entire region needs a comprehensive alternative transit system. Cars and their emissions are not economically or environmentally sustainable in the long run.

The basis of these projections for needing other forms of transit are: an increase in population (both resident and visitors), higher vehicle fuel costs, higher road building land, labor, and materials costs, the ever-increasing costs of personal vehicle ownership (cars, insurance, and health from increased pollution). Also a factor is the possible damage to the environmental health of the region if we keep building and salting roads and losing habitat.

In the long term, the area’s future transportation needs for both the important tourist sector and for the local service sector employees cannot be realistically met using current surface modes of transportation (cars and buses) for several reasons:

- Currently, there is no integrated approach to get people to or from the train station, the airport, the region’s resorts or other recreation sites. In fact, a visitor cannot readily get from the airport to the San Diego Zoo or Balboa Park - two of our most important attractions.

- Meeting the needs of future population increases would require expensive and potentially impractical road lane increases. Right of way acquisition costs, construction costs, and on-going maintenance and snow removal costs may not be adequately funded by federal, state, and local sources to achieve the transportation needs of the area.
A Mental Exercise to Prove the Need for Transit Alternatives

Others may have their own ideas on how to solve the transportation dilemma; some may even insist that we can continue to use cars and gasoline into the indefinite future – regardless of social, environmental, and economic factors. In this regard I ask the reader to perform a mental exercise as described below.

Imagine that the problems being addressed in this proposal can be seen as wheels in a combination lock or a slot machine. On each “wheel” is a series of numbers or ratings representing the probability of that wheel’s problem being more or less severe. You can develop your own set of “wheels” and your own solution based on your set of factors. This is my set of “wheels:”

- One “wheel” is the future “retail” cost of fuel (optionally including or excluding that portion of the national defense budget related to protecting oil production and delivery). This is a large, but hard to quantify figure (but it will almost certainly trend upwards in a spiral as scarcity drives up the price). 30% of the fossil fuel burnt for energy in America is used for transportation. Even as large deposits of oil have been discovered and extracted via fracking on American soil, the future of fossil fuel-based personal transportation is likely to be a short ride.

- Another “wheel” is the cost to build and maintain more roads for future population growth. In some case this approach is spending some of the last of the oil and infrastructure dollars on a system that we really need to supplement with alternatives sooner rather than later.

- Another “wheel” is the need to provide transportation to our region’s locals, visitors, our working poor, and our youth under driving age. The declining percentage of young people who own cars points to the need to address this generational transition.

- Another “wheel” is whether enough people will be able to afford a new electric or hybrid car. Usually these new technologies are at first economically out of reach of many people. Also, these new technologies require the evolving of their own charging or fueling station networks.

- Another “wheel” is the access to rights of way to build new roads – complicated by our terrain which limits practical routes. The steep grades leading out of Mission Valley onto the mesas to the North and South makes extensions of the trolley tracks problematic at best.

- Another “wheel” is the need to lower the region’s “carbon footprint” by developing modes of transportation that do not require 100-200 horsepower vehicles to move 1-4 people 10-20 miles (at a mile a minute) between workplaces, resorts, and lodging.

- Another “wheel” related to the hidden costs of the current transportation system are the human injuries and medical and legal costs stemming from accidents. Factoring in the potential to reduce these costs and to reduce drunk driving incidents weights this wheel’s importance.

- Finally, imagine the last “wheel” which represents the likelihood of developing soon an entire new, more efficient energy and transportation infrastructure before we run out of affordable oil. Obviously the solutions proposed herein are not the only viable solutions to the need for an area-wide transportation solution. It may be that these solutions are not the most practical or cost effective, but any solution agreed to and acted upon needs to meet some or most of the criteria outlined in the section “The Need for Alternative Mass Transit.”

These proposed solutions will not be built in the next 3-5 years, but the need for them will not go away. Many climate scientists are saying that we need to start now to begin mitigating the effects of climate change. Unless we start soon to address these long-term issues, the “long term” will be upon us.
When We Reach The Oil Cost Tipping Point

The projected eventual rise in the cost and the lower availability of gasoline will compound the road expansion and maintenance problems due to the lower revenues from gas taxes.

Development and construction of the system may take decades. The points at which the funding and political and social willpower to make the needed transit infra-structure changes will be “tipped” or driven by fuel costs (and availability), carbon costs or “soot taxes,” etc. A part of the initial project study’s need will be to determine if some of proposed transit system’s energy sources could be developed and distributed regionally – instead of relying on oil-based imports. Another and perhaps most critical factor determining the projects’ success is whether the new components of this multi-modal system could be based on business models that show the potential profits to be made from have a system in place before oil prices limit our options even more. An obstacle to looking at this potential profit picture is the long list of artificial subsidies we pay as individuals and as a society to make automobiles SEEM affordable. If our mindsets were such that the nation’s automobile-related road maintenance and medical expenses and the costs of continued military presence in the Persian Gulf were counted in the price at the pump – we would see the true cost of cheap gas.

Doing Nothing Is Not an Option

According to the California State Energy Commission over 40% of all energy used in the state moves people and goods. Almost all of this transportation energy demand is met by petroleum usage. California’s nearly 26 million registered vehicles consume approximately 480 million barrels annually (16 billion gallons of gasoline and 4 billion gallons of diesel). This makes the state the third-largest consumer of transportation fuels in the world behind the United States as a whole and China. This consumption costs the state's economy and environment. In California 45% of the state's crude oil and 10% of its refined fuel are imported. The state is heavily dependent on foreign supplies. Furthermore, California's transportation sector is the single largest contributor of greenhouse gas (GHG) emissions, producing nearly 39% of the state's total carbon emissions.

The TRUE costs of doing nothing will be that we leave our children and grandchildren strapped to an expensive, destructive, and unsupportable personal car-based transit system with no clear alternatives to replace it with in the foreseeable future. This is compounded of course by the effects of climate change that they will have to deal with.

The assumptions of the need for and the practicality of this type of system are based on the following factors. One key assumption that needs to be “stress-tested” – is that whether or not this type of system would have a lower impact than the equivalent car passenger load in terms of land use, habitat destruction and migration interference, fuel consumption, carbon and other emissions, and material deposits (tire bits, engine oil, glass, etc.). Another assumption is that the local working people and school commuters would use the system regularly (instead of their cars) and that visitors would use the system in substantial numbers.

System Requirements

When looking at the design and implementation of any system, the first step is to define the actual operating requirements of the system – stripping away any preconceived notions including the design of legacy existing systems. In this proposal, the requirements are to move people and their packages or gear from a variety of locations to a set of destinations.

The movement of people and their things does not in fact require roads and cars. If the requirement is to lower dependence on foreign and domestic oil and to reduce pollution and greenhouse gases, then roads and cars are actually precluded from the design because they do not meet these criteria.

The area’s geography, large weekend & holiday tourist influx, and the dispersed nature of our civic, commercial, and recreational centers drive the basic requirements of any mass transit system.
Any practical regional transportation system must meet the following requirements. The system must:

- Accommodate increases in both resident and visitor populations.
- Provide safe, reliable, and timely access to personal transportation.
- Help avoid the ever-increasing costs of vehicle ownership (car costs, insurance, and health care from accidents and pollution).
- Reduce the need for more road building with ever higher land and right of way acquisition costs and reduce maintenance and snow removal costs.
- Avoid environmental damage to the region resulting from continued road building and habitat and migration corridor loss.
- Help forestall the projected rise in cost and lower availability of gasoline.

The system envisioned attempts to solve several key transportation related issues.

- It must be environmentally sound and not require large land or energy use or have erosion impacts.
- It must be cost-feasible to build and run in terms of right of way costs, construction costs, and operating costs.
- It must be attractive in terms of price and convenience to draw riders away from their cars.
- It must be available 24/7 (or at least 18/7) with minimum staffing costs while it must also meet the needs of resident and vacation riders to reach their destinations in a reasonable timeframe.
- It must have excellent, comprehensive rider services such as fool-proof baggage handling, valet and sky cap services, rental lockers, and even tour guides or trip escorts for young riders.

Of course for any of these new or alternative modes to be considered a worthy replacement for the current, automobile-based infrastructure, the mode(s) will have to be more energy efficient per passenger mile and have lower negative construction and maintenance environmental impacts than do cars and highways. The long term costs/benefits picture must include the energy, material, and environmental costs of the construction of any alternative infrastructure.

Any alternative regional transit infrastructure that will compete for customers, capital financing, (and possibly tax dollars) with the existing street-and-vehicle based systems must address some critical issues. These include:

- “Build-ability” – It must be a proven concept in terms of construction costs, the populations served as a revenue base (and the costs to those displaced by the new system), and other limits - such as terrain.
- Economic viability in terms of attractive long term solid returns on initial construction investments and a revenue positive (or at least a revenue neutral) outlook on the operating costs. Some system business models would base some of the operator profits and initial capital returns on vendor leases, advertising revenues, parking, and other sources.
- Measureable environmental mitigations (or even emission reduction-based gains) based on regional vehicle miles reduced, carbon offsets, or some other quantifiable rating.
- Convenient in terms of making it so that a substantial portion of the area’s tens of thousands of weekend tourists and a significant segment of our work force would use all or part of the alternative systems being proposed.

In areas where relatively level rights of way are available, fixed rail systems may have applications. The LEITNER MiniMetro® offers outstanding flexibility for integration within the urban infrastructure.

The compact design of the cars means a minimum footprint for the system as a whole and optimum harmony with existing buildings and structures. The APM technology also handles demanding routing
requirements, with such features as a 12% hill-climbing capability, and the availability of overhead guideways or underground sections. These rail-based systems may be too expensive per mile to deploy throughout the region, but they may have applications.

**The All Important Last Mile Systems**

Of course the major obstacle to the introduction of any new infrastructure system is “the last mile.” In the case of public transit, the “last mile” is really the key to success or failure. Success will depend on making it easy enough to get you, your children, and your groceries to and from the nearest transit station to your home, work, or recreation destination.

The range of “last mile” options must be comprehensive. The system must offer scheduled neighborhood shuttle service, on-demand service like taxi or dial-a-ride, bike or even smart car short term rentals, and even valet delivery for packages and gear. Easy to use passenger pick up and drop off zones for cars and buses will be part of the planning which will separate vehicle and pedestrian approaches. Bike racks and long term lockers and other aids to cycling or walking will be part of the station and system design.

For the system to succeed it will be essential to blend all regional modes of transportation into the gondola way-stations and terminals. Buses, Amtrak, private plane owners, cabs, pedestrian, bike, and ski traffic must all be accommodated.

The region will ultimately need to be served by a mix of transit modes including commercial and private aircraft, cars, trucks, and buses, trains, ferries, and aerial tramways. All of these transit modes must integrate with bike lanes and pedestrian paths and neighborhood shuttles to address the “last mile” issues.

**Energy Usage Comparisons**

Perhaps one of the most compelling reasons to consider aerial tramways as an important component of an integrated regional system is the energy usage per passenger mile as shown in the table below.

<table>
<thead>
<tr>
<th>Transport Mode</th>
<th>Average Passengers Per Vehicle</th>
<th>Btu Per Passenger-Mile</th>
<th>Mj Per Passenger-Kilometer</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vanpool</strong></td>
<td>6.1</td>
<td>1,322</td>
<td>0.867</td>
<td>Most efficient auto-based system – Use Same Roads</td>
</tr>
<tr>
<td><strong>Efficient Hybrid</strong></td>
<td>1.57</td>
<td>1,659</td>
<td>1.088</td>
<td>Toyota Prius - Use Same Roads</td>
</tr>
<tr>
<td><strong>Motorcycles</strong></td>
<td>1.2</td>
<td>1,855</td>
<td>1.216</td>
<td>Use Same Roads</td>
</tr>
<tr>
<td><strong>Rail (Intercity Amtrak)</strong></td>
<td>20.5</td>
<td>2,650</td>
<td>1.737</td>
<td>No Tahoe Service</td>
</tr>
<tr>
<td><strong>Rail (Transit Light &amp; Heavy)</strong></td>
<td>22.5</td>
<td>2,784</td>
<td>1.825</td>
<td>No Tahoe Service</td>
</tr>
<tr>
<td><strong>Rail (Commuter)</strong></td>
<td>31.3</td>
<td>2,996</td>
<td>1.964</td>
<td>No Tahoe Service</td>
</tr>
<tr>
<td><strong>Air</strong></td>
<td>96.2</td>
<td>3,261</td>
<td>2.138</td>
<td>Small Jets Only</td>
</tr>
<tr>
<td><strong>Cars</strong></td>
<td>1.57</td>
<td>3,512</td>
<td>2.302</td>
<td>Use Same Roads</td>
</tr>
<tr>
<td><strong>Personal Trucks</strong></td>
<td>1.72</td>
<td>3,944</td>
<td>2.586</td>
<td>Use Same Roads</td>
</tr>
<tr>
<td><strong>Buses (Transit)</strong></td>
<td>8.8</td>
<td>4,235</td>
<td>2.776</td>
<td>Use Same Roads</td>
</tr>
<tr>
<td><strong>Aerial Tramway</strong></td>
<td>4</td>
<td>500</td>
<td>0.263763963</td>
<td>Dramatic Efficiency Gains – even at ½ capacity – if all 8 passenger gondolas were full – 250 BTU PPM.</td>
</tr>
</tbody>
</table>

*Table 1 - Energy Used Per Passenger Mile*
Future modes of transportation, such as sufficient numbers of electric vehicles or hydrogen powered vehicles do not yet exist for commercial purposes and do nothing to solve our problems in the near term. Also, we would need to re-wire our local grid to accommodate the charging stations.

Improved surface vehicles – regardless of their fuel source - all still require scarce roadway capacity and the snow removal, parking, and increased road maintenance associated with their use.

Fusion power, wind power, photovoltaic cells, “clean coal”, hydrogen fuels, and other technologies may eventually become part of the solution, but we might not have these advances on line for decades.

Energy Efficiency: Aerial people movers use less energy per passenger mile than any other form of mass transportation. A fully loaded aerial people mover uses about 250 BTU/passenger-mile compared to 3,500 BTU/passenger-mile for light rail or bus systems. The energy savings come from a variety of factors that include a stationary drive system, constant rope speed and a low carrier to passenger weight ratio.

In terms of capacity, aerial tramways are the most cost efficient aerial people mover using 8 passenger gondolas. Using these gondolas, the system can transport 2,800 passengers per hour in each direction (equal to a fully loaded 40 passenger bus leaving each terminal every 52 seconds).

**The System Centerpiece – A Proposed Aerial Tramway: “A Subway in the Sky”**

The core of the region’s mass transit system is the trolley. Although this is an important first step in a regional solution, it has several constraints including:

- Riders must often drive to the trolley stations to begin using the system since it serves commercial sections of town rather than the residential areas. Compounding this is the fact that parking is limited to a small number of stations.
- The trolley does not serve the airport, the zoo, Balboa Park, or the beach regions.
- The grades needed to climb out of the current lines to reach the mesa areas are too steep for trolley tracks.

The aerial tramway system proposed here is one approach to solving the long-term transportation needs of locals and visitors in a way that reduces reliance on automobiles and imported fossil fuel.

The solution advocated in this proposal is to create a system of high-speed, 3-cable detachable aerial tramway gondolas. This gondola system will be the critical intertie between the trolleys and be the region’s inter-modal infrastructure. This series of 3-wire aerial gondola lines will service the key resorts, towns, points of interest, and other transit hubs.

The system would, for the most part, use “off-the-shelf” technologies to avoid costly development efforts. The tramway system would use 6-8 passenger gondolas to transport people (and their baggage and sports gear) between the region’s residential neighborhoods, commercial districts, schools, and resorts and recreation facilities. A series of stations would be the hubs of the system to distribute riders to the area’s many far-flung neighborhoods and recreational areas.

Even though the proposed system is an aerial tramway, the concept is based on the idea of a “Subway in the Sky” - an integrated, regional system of safe, reliable, timely, personal transportation.

This aerial, point-to-point systems make sense to move people.

The fact that only the system’s towers and stations would have land footprint and erosion impacts makes this transit mode more suitable to the region’s sensitive areas than surface-based modes.
How the System Fits the Local Needs

Our area with its population dispersed over a miles-wide region cannot afford traditional urban light rail or other high rider density type systems. This combined with the fact that on weekends and holidays our region blooms by tens of thousands of people needing to use the same roads – which are sometimes impossible to navigate. In an emergency, this could be a disaster.

Other considerations include:

- The proposed tram system features the advantages of being “on-demand” - which is important in that it is impractical to expect tourists and workers to wait for a bus.
- The low staffing requirements and automated nature of the system make significant reductions in labor costs compared to high wage bus or train divers.

The System’s Potential Benefits

The system envisioned offers several potential advantages. In addition there may be “pay-back” funding from some of the various shared cost savings or post construction revenue streams (such as those outlined below). Possible cost offsets would arise from:

- Reduced road use costs - maintenance (less chained-tire wear and tear, less snow removal and sanding), less tire and oil run-off, less gas used and tailpipe emissions.
- Potential sales of carbon offsets could be significant.
- Less long range road building and maintenance would be needed less asphalt, less labor, lower land use costs.
- Advertising on the gondolas and at the stations would generate some revenue.
- Cell and Wi-Fi rights on the towers and use fees could be revenue positive.
- Utility (power and cable) lines could be strung on upper branches of towers and be part of the cost structure.
- The local school district could avoid some of the costs of running some of their bus fleet.

Details of the Proposed Aerial Tramway Solution

Imagine waiting in a comfortable station, boarding a gondola with only a few other people, and then having the luxury of reading a paper, using your PC or cell phone, or playing with your kids as you are whisked into town instead of fighting ever increasing surface street congestion.

The solution advocated in this proposal is to create a region-wide transportation system using 3-cable detachable aerial trams. The system would, for the most part, use “off-the-shelf” technologies to avoid costly development efforts. The tram system would use 6-8 passenger gondolas to transport people (and their baggage and sports gear) between the residential neighborhoods, commercial districts, schools, and resorts and recreation facilities. A series of stations would be the hubs of the system.
Even though the proposed system is an aerial tramway, the concept is based on the idea of a “subway in the sky” - an integrated, regional system of safe, reliable, timely, personal transportation.

The system would be a world-class transit asset in a world-class resort region. Local residents and international visitors alike could be assured of easily getting on a gondola to their destination every few minutes, unlike waiting for an infrequent (and often late) bus.

This system or one that delivered the same benefits could be the key to future sustainable growth in our region without having to pave over our paradise.

The advantages in running the lines above ground are: lower right of way costs, reduced land footprint and impact, less snow removal and maintenance costs, and more point-to-point access in an area that is really a set of towns, ski resorts, and service areas that are in effect the spokes of a wheel.

The system of 6 to 8 person detachable gondolas with above ground stations and transfer points offers several advantages:

- Individual to small group sized gondolas would allow for the transportation of visitors, area workers, and their baggage and sports equipment far more readily than using a bus.
- Large groups or families with baggage could rent two gondolas in sequence to stay together. Valet service would be available to help with gear or special needs passengers.
- Gondolas would allow users to have far more flexible transit scheduling – with a minimum of initial wait times and layover delays.
- Special non-passenger gondolas could be reserved to transport goods and make deliveries to local businesses – much like a local parcel service. Possibly the system could have special flatbed gondolas for bikes or large parcels.

**The Routes**

San Diego is one of the largest cities (in area) in California – but in terms of populated areas it is really a widely dispersed set of neighborhoods. It is the peculiar nature of San Diego’s neighborhoods (which are widespread and relatively isolated from each other by canyons) and the lack of in-fill plans which lends itself more than many towns to a series of point-to-point aerial tram lines. Even though the tram average speed will be significantly slower than auto travel, the lack of stop signs and traffic and parking delays will help push up the average capacity.

Initially the routes would include:

- A line that ran from the airport to the zoo parking lot going up Maple Canyon.
- A line going from North Park down the Texas Street Canyon to intersect the trolley line in Mission Valley.
- A line going from City Height down the Fairmont Canyon to intersect the trolley line in at Grantville.
- A line going from Linda Vista down to meet the Morena the trolley line and a line from there to Point Loma.
- A line going down the College Ave. corridor to connect that neighborhood with the SDSU Campus and its Trolley Station.
- Lines from the Old Town Transit Station to the beach communities.

The fully implemented system would serve the residential, business, and recreational areas of San Diego. The proposed station scheme would make it so that locals and visitors were always within a short walk or shuttle ride of a station near a commercial or recreational area.
Also there would be special stops at the area’s schools. Access at these points would be limited so that only carded students, parents, teachers, and staff could embark or disembark at these campuses for reasons of student safety. At night, the gondolas would not even stop at the schools (unless the rider had a special event permit).

**The Stations**

There would be several types of stations: Switching Stations, In-Line Stations, Terminal Stations, and a Maintenance Station / Tram Barn. The stations would all be, in effect, “inter-modal” transit hubs with some parking, shuttle and long haul bus stops, car and bike rentals and some basic food and news stand type services.

Each neighborhood way-station would be served by shuttle service that ran every 15 minutes to pick you up or drop you off at your doorstep. One suggestion would be to integrate a fleet of small electric vehicles into each station to serve its neighborhood or recreational facilities.

- **Switching Stations (Roundhouse Stations)** - These stations would be situated in key locations that offer branching of lines into other tram lines. These stations would have a large, slow moving oval loop and a switching or pass-through system that would serve as the interchange between the various main lines, connector lines, and major trunk lines. A series of commands keyed into the rider’s ticket would dictate the automatic switching of the gondolas to their destination (which would also determine the fare). If they just got the ticket for the Red line and got on a Red car, that’s all they would need to do to get to the "Red Resort," for example.

- **In-Line Stations** - The system will need In-Line or Way-stations for several reasons: to collect and disperse riders closer to their neighborhoods than via the Main, Terminal, or Switching Stations and to accommodate major changes in the line’s direction. The in-line way-stations would be simple raised platforms with stairs and wheelchair lifts. Riders would be dropped off or take a neighborhood shuttle bus, or bike, ski, or walk to these stations.

![Figure 2 - Truckee Main Roundtable Station](image-url)
• Terminal Stations - The Terminal Stations would be at the ends of each line. At the terminal stations large, multi-level parking garages would be “hidden” behind a “wrap around” set of shops and visitor services store-fronts. The sales of vendor permits, parking, valet services, and advertising space would help defray station operating expenses. These stations would have connections to other local transit. These stations would have paid bike and gear storage. The lines would simply loop at these stations and a passenger could either board or disembark at these platforms.

• Maintenance Stations / Gondola Barns & Car Parks – All major stations would have direct ties to large enough parking structures to accommodate the full capacity influx of cars. These multi-level car parks would serve double duty as gondola barns to store “off-line” gondolas. As the parking places in the structure fill will cars, the gondolas would go “on-line.” The street sides of the parking structures would have vendor stalls and baggage service booths. These stations would serve the Main Station and the Terminal Stations with maintenance tools, hoists, and facilities to work on the gondolas.
Rider Services

For the system to be a success in the fullest sense of the word it must have excellent, comprehensive rider services such as fool-proof baggage handling, valet and sky cap services, rental lockers, and even tour guides or trip escorts for young riders.

Each station would have a range of services depending on the size and type of station. Even the In-line Stations would have a small valet/sky cap services staff, a small number of rental lockers, links to other transit, and automated baggage handling. The larger Terminal and Main Stations would have valet parking, coffee and news stands, small food vendors, sports equipment rental stands and lockers & parcel storage.

The Business of Baggage Handling

As part of the system’s rider services there must be fool-proof baggage handling. An essential part of the customer’s satisfaction with their tram-transport experience will be how well we handle and keep safe their baggage and gear (such as bikes or surf boards).

This proposal envisions the riders’ first act after showing their pass or buying their tickets would be to be given one or more luggage and gear carts (practically right at curbside). They would then stow their luggage and gear in these bar coded, 4-wheeled carts. Some of these carts would be customized to best store bikes, skis, or other oversized items. These carts would have flip up handles, that when raised, would lower the wheels to make getting to the tram car and then out of then next station easier. Then, when the handle is folded in, the wheels retract to attach the cart to the back of your gondola as you board it.

The loading side of the tram stations would always be a little higher than the unloading side of the station platform. When ready to board, the passenger would push their gear cart into slots in a shallow tray in the platform next to their boarding zone. When the desired tram car was ready to board, this tray and its carts would drop in and attach itself to the bottom and back of the gondola. Weather sensitive stuff would be in the sealed carts. These carts would then accompany the passengers until their station stop (or even to their hotel while they went to the ski slopes). When they get off the gondola at their station or recreation area, the tray and its carts slides down to the baggage claim portion of the station’s loading carousel.

Customers could opt to have their luggage sent ahead to their hotel while they start the day at the slopes or water skiing in the summertime. Also, the system operator would relationships with gear rental agencies who may offer on-line reservations to make it so that when the riders got to their tram station, pre-loaded carts of gears tubs with skis and boots and poles, bikes, or water skis, etc. could meet them at the station.

To transition from the stations to the real “wheeled” world, these baggage carts could be joined in a train down to curbside. Then a whole cart or tubs could be off-loaded to flat bed golf carts, tour or shuttle bus bottom bays, or even onto a snow sled without lots of lifting and get to them to their destination and ensured delivery by the tram system’s concierge services (like bell boys on wheels). The visitors could conceivably send out for pizza or even have dry cleaning done via the tram.

These are ways to almost “fail safe” the customer baggage and gear experience that will make users want to return to enjoy the travel experience in the region.

The Switching System

The Doppelmayr Ctec Company already makes a “combination” system in which gondolas and chairlifts can be interspersed on the same line and the ratio of gondolas to chairs can be varied as needed. With this system, the tramway would be configurable to put the required number of destination-coded gondolas on the line.
The Leitner Poma Company makes a series of products which may be applicable including a “Pulsed Gondola System.” This system trains with one, two or three carrier vehicles (and up to six evenly spaced trains on the rope). The system is designed to slow down for loading and unloading when the vehicles are in the terminals. The vehicles have options for heat and communication. Pulsed gondolas are generally used for distances less than 3,000 ft., but can go up to three miles as was done in Perugia, Italy. Pulsed Gondola lifts are an excellent option for pedestrian traffic and offer ideal comfort, transporting up to 500 passengers per hour with line speeds up to 5 meters per second.

In some respects, this aerial tramway line switching mechanism is perhaps the only novel idea in the whole proposal and may require some R&D and proof of concept and safety testing. Traditional approaches, such as having lines simply terminating at a shared platform – requiring un-boarding and re-boarding would simplify the technology, but lessen the experience.

The first implementation of the system may utilize strictly commercially available stations where each line terminates in a shared platform – requiring passengers going to further destinations to disembark and then re-embark to another “train.”

Using this “off-the-shelf” approach simplifies the initial design, removes the need for any new technology development and certification, and reduces costs; making the initial system far more “shovel ready”. A key design feature would be to allow for the inclusion of a switching system at a later date to allow riders to reach any destination without disembarking and re-embarking. The initial system budget and timeline may be based on this simplified design unless an existing switching system is practical and affordable.

There are some of the advantages of having fully detachable gondolas in which only the shuttles stay attached to the lines at all times. The system would, in most conditions, run with 2 out of 3 shuttles occupied. Under low-usage conditions the gondola to shuttle occupancy ration would be 1 out of 3 (reducing system weight and wind loads and energy usage). In high-demand situations (holiday weekends, etc.) all 3 shuttles per gondola “destination set” would be filled. Yet another flexible aspect of the system would be the ability to bring on-line one or more specialized gondolas as needed (for transporting those with special needs, for using flat-bed load carrying gondolas, or for adding more gondolas to one of the colored lines to increase that destination’s capacity temporarily.

**Undercrossings & Line Angles**

In some areas – due to height restrictions and factors such as the lack of overhead rights of way, the tramway may have to dip to near street level – almost like a string of cable cars. Special towers would drop the line into the street level mode where small wheeled rails could guide the gondolas in the underpass. This may be a requirement for getting to the airport, for example.

![Figure 5 - Sample Undercrossing](image-url)
Although tramway routes typically must travel in a straight line (usually with one degree), turning stations have been developed to accommodate more radical changes in line direction. Even without these special turning stations, in most cases, the location of the system’s in-line stations would coincide with where the line would need a change of direction.

![Turning Station](image)

**Figure 6 - Turning Station**

### Section III – Costs, Benefits, & Stakeholders

**Projected Costs**

The costs of constructing and operating the system must be considered in light of the benefits gained in the short term and longer term as the system amortizes itself through continued use. The economic viability of the system will depend on a consistent ridership comprised of visitors and local repeat riders in addition to the revenue generated by other sources such as parking fees, advertising fees, carbon offset sales, and vendor rental fees. In order to understand the system’s economics a survey must be conducted to determine ridership potential and the costs of delivering service (and therefore the ticket pricing). Pricing factors (such as school district student ticket pricing or neighborhood association member pricing) would all have to be considered in the study. A weight- or volume-based price structure would also have to be devised for freight if that service proved to be a profit center. These combined factors (of ridership and ticket price and other revenues) balanced with capital and operating costs will dictate the true cost of the system.

The tables below show some projected costs of the major system elements.

#### Infrastructure Costs

<table>
<thead>
<tr>
<th>Towers Per Mile</th>
<th>Miles of Line</th>
<th>Total Towers</th>
<th>Cost Per Tower</th>
<th>Towers</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>45</td>
<td>360</td>
<td>$500,000</td>
<td>360</td>
<td>$180,000,000</td>
</tr>
</tbody>
</table>

4/3/2019  
Copyright © 2019 Jeff Sparksworthy
<table>
<thead>
<tr>
<th>Towers Per Mile</th>
<th>Miles of Line</th>
<th>Total Towers</th>
<th>Cost Per Tower</th>
<th>Towers</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Cables Per Mile</td>
<td>Miles of Line</td>
<td>Total Miles of Cable</td>
<td>Cost Per Mile</td>
<td>Total Miles of Cable</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>45</td>
<td>270</td>
<td>$15,000</td>
<td>270</td>
<td>$4,050,000</td>
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</table>

Table 2 – Projected Infrastructure & Facilities Costs

**Gondola Costs**

<table>
<thead>
<tr>
<th>Number of Gondolas Per Mile</th>
<th>Miles of Line</th>
<th>Total Gondolas</th>
<th>Cost Per Gondola</th>
<th>Total Gondolas</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>45</td>
<td>720</td>
<td>$18,500</td>
<td>720</td>
<td>$13,320,000</td>
</tr>
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</table>

Table 3 – Projected Gondola Costs

**Station Costs**

<table>
<thead>
<tr>
<th>Station Type</th>
<th>Station Cost</th>
<th>Acreage</th>
<th>Land Costs ($650,000 Acre)</th>
<th>Combined Land &amp; Structure Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal</td>
<td>$17,500,000</td>
<td>5</td>
<td>$3,250,000</td>
<td>$20,750,000</td>
</tr>
<tr>
<td>School (Limited Access)</td>
<td>$10,000,000</td>
<td>1</td>
<td>$650,000</td>
<td>$10,650,000</td>
</tr>
<tr>
<td>In-line Station (Neighborhood Transfer)</td>
<td>$7,500,000</td>
<td>1</td>
<td>$650,000</td>
<td>$8,150,000</td>
</tr>
</tbody>
</table>

Table 4 - Projected Station Costs

**Benefits**

The proposed aerial tramway system will have some benefits that manifest almost immediately and others that accrue over time. The initial paybacks include: lower pollution and energy use, lower travel-related risk, convenient public access to residential, recreational, and retail areas, increased tourism visitors, and lower road maintenance costs. The longer benefits that would accrue would come from factors such as: carbon offset sales, a healthier population (due to the small amount of additional walking and fewer car-related injuries), local access to state and federal mass transit dollars, and having a system in place when personally owned cars become less and less affordable and environmentally viable.
System Capacity

Potential Riders per Hour

A study conducted by the group “Reconnecting America” for the town of Hercules, CA cites existing reversible ropeway large gondola systems with cars carrying from 20 to 200 people traveling at 28 mph. These systems are capable of carrying from 500 to 2000 people per hour. The same study cites smaller “detachable” gondolas with 4-12 people capacities with potential ridership of 3600 people per hour travelling at 14 mph. Bi-cable and tri-cable systems combine some of the advantages of both reversible ropeway and detachable gondola systems. These systems have smaller energy consumption, better wind stability, and longer spans between towers. These systems can accommodate up to thirty passengers and a riders per hour capacity of 6000 persons. The Dopplemayr Company rates their systems at 6000 passengers per hour and their systems reach speeds of over 17 MPH.

Potential Total System Capacity

If the fully built system of 45 miles of tram line had 8 gondolas per mile with an 8 passenger capacity, the system could accommodate 2,880 people at any given time. With ¼ hour trip times, the system could handle 72 “turns” in riders per 18 hour day. This means a potential total daily capacity of 207,360 people. Even if the system only ran at ½ capacity, that’s still over 100,000 riders per day that would otherwise take all or part of a personal car to take the same trip. Admittedly, there will be a mix of slow days and “peak” weekends that will cause these ridership numbers to vary seasonally. This “seasonality” of the ridership and how that may affect the economics of the system in terms of operating profits and losses must be studied.

Carbon Offsets

$1374.00 is the current market value of the carbon offsets achieved by pulling off the roads five Ford cars (Tempo and Taurus models driven 60,000 miles or 12,000 miles per year for a 5 year service life). The amount of CO2 not emitted in this scenario is 55,879 lbs. If the system could remove 5000 similar cars for five years, this would be a carbon value of $1,374,000 and an emissions reduction of 55,879,000 lbs. This “5000 cars off the road” figure is based on reducing the usage of 25,000 local and visitor cars by 20% over a five year period. (Few will use this system to the total exclusion of their personal vehicle as long as they can afford gas). If carbon offsets gain in value or if the system usage is greater, then the value of the total offsets increase. If the system displaced enough carbon, the offsets could be sold on the emerging cap and trade markets. The system will of course use power for the electric motors and the station heating and lighting. There will need to be a 500 HP motor every 3 miles (about 15 motors) and the full system’s power requirements must be deducted from the carbon offset equations based on the number of cars taken off the road.

Potential Revenues

The following table shows some revenue projections from advertising and ticket sales.

<table>
<thead>
<tr>
<th>Revenue Sources &amp; Projections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
</tr>
<tr>
<td>Advertising</td>
</tr>
<tr>
<td>Projection Basis</td>
</tr>
<tr>
<td>Potential Revenue Sources</td>
</tr>
<tr>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>420 Station Ads</td>
</tr>
<tr>
<td>720 Gondola Ads</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Ticket Sales</strong></td>
</tr>
<tr>
<td><strong>Projection Basis</strong></td>
</tr>
<tr>
<td>26 Major Holiday Days with 10,000 Riders per Day</td>
</tr>
<tr>
<td>90 Days with 5000 Riders per Day</td>
</tr>
<tr>
<td>Yearly Non-Resident Holiday Riders</td>
</tr>
<tr>
<td>Yearly Non-Resident Weekend Riders</td>
</tr>
<tr>
<td>Yearly Non-Resident Weekday Riders</td>
</tr>
<tr>
<td>Basis</td>
</tr>
<tr>
<td>Yearly Adult Resident Pass Riders</td>
</tr>
<tr>
<td>Basis</td>
</tr>
<tr>
<td>Yearly Student Pass Riders</td>
</tr>
<tr>
<td>Basis</td>
</tr>
<tr>
<td>Yearly Adult Resident Pass Riders</td>
</tr>
<tr>
<td>Basis</td>
</tr>
<tr>
<td><strong>Total Yearly Income</strong></td>
</tr>
</tbody>
</table>
While $23 million dollars is not an insignificant figure, that amount may in fact be only enough to cover operating expenses and not to amortize the system. However, other potential revenue sources, such as coop agreements with the region’s ski areas and resorts, transit tax subsidies, and even the eventual sales of carbon offsets may bolster this revenue stream.

**Some Cost Background**

**Squaw Valley, California – Actual System**

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>2009 Value</th>
<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5.5M ($14M / Mile)</td>
<td>$33.5M</td>
<td>.38 Mile</td>
<td>1968</td>
<td>120 person capacity</td>
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<table>
<thead>
<tr>
<th>Yearly Operating Costs</th>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under Study</td>
<td>Under Study</td>
<td>Under Study</td>
<td>$16-29</td>
<td></td>
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**Telluride, Colorado – Actual System**

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>2009 Value</th>
<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>$16M ($6.4M / Mile)</td>
<td>$21.6M</td>
<td>2.5</td>
<td>1996</td>
<td>32 – 8 Passenger Cars</td>
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<table>
<thead>
<tr>
<th>Yearly Operating Costs</th>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
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<tbody>
<tr>
<td>$3.5M</td>
<td>Under Study</td>
<td>Under Study</td>
<td>Free</td>
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**Roosevelt Island – Actual System**

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>2009 Value</th>
<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
</tr>
</thead>
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<tr>
<td>$20M ($33M / Mile)</td>
<td>$74.5M</td>
<td>0.6</td>
<td>1976</td>
<td>2 Cars - 125 People/Car</td>
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</table>

<table>
<thead>
<tr>
<th>Yearly Operating Costs</th>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
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</thead>
</table>
### Portland, Oregon – Actual System

<table>
<thead>
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<th>Construction Costs</th>
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<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$57 M ($91.2M / Mile)</td>
<td>$60.5M</td>
<td>5/8 (3,300 Feet)</td>
<td>2006</td>
<td>Projected at $15 M</td>
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</table>

### Yearly Operating Costs

<table>
<thead>
<tr>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7 M</td>
<td>1.5 M</td>
<td>$1.81</td>
<td>$4.00</td>
</tr>
</tbody>
</table>

### Palm Springs, California – Actual System

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>2009 Value</th>
<th>Miles of Line</th>
<th>Year Built</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3M</td>
<td>$21.2M</td>
<td>2.5 Miles</td>
<td>1962</td>
<td>12 Million Passengers Carried</td>
</tr>
</tbody>
</table>

### Yearly Operating Costs

<table>
<thead>
<tr>
<th># Passengers Per Year</th>
<th>Cost Per Passenger Mile</th>
<th>Retail Ticket Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under Study</td>
<td>Under Study</td>
<td>Under Study</td>
<td>$15.00-22.00</td>
</tr>
</tbody>
</table>
References to Other Systems

The Gondola Project

The Creative Urban Projects group documents the various projects in operation or under construction in the world.

The Gondola Project

Hercules, California – Proposed

www.reconnectingamerica.org/public/download/aerialtram

Ogden, UT

http://archive.ogdencity.com/displayarticle50.html
Whistler, Canada
http://ww1.whistlerblackcomb.com/p2pg/

Skyscrape

Below are some comments from this source:

They (Trams) work really well in Ski resorts (some of the densest and highest traffic areas around) and some are actually building them across large swaths of the town allowing people on the far side of town to be quickly whisked to the mountain top.

... Telluride has a gondola that takes people from an area called Mountain Village to the town of Telluride. The trip is roughly 3 miles and takes 12 minutes to travel to the full length, and you have the option of stopping midway at a transfer station to get to another area of development. The gondolas can comfortably hold four people and are completely enclosed thereby protecting passengers from the elements. These gondolas also slow down to a creeping speed at the stations facilitating easy transfer on/off. I have also heard that there are plans to use a similar (but possible faster) gondola system to connect Breckenridge and Vail.

A system like this in mid-sized cities would be a phenomenal way to travel! Here are some pros to establishing a mass-transit system like this:

1. Much cheaper development costs than light rail. Telluride spent about $16 million on theirs. That's $5-6 million/mile compared to light rail costs of ~$50 million per mile.

2. Land acquisition is much less of an issue since current right-of-way could be used. The gondolas could actually travel directly above traffic with support pillars in the medians or adjacent to the roads.

3. Immediate service. Gondolas come into the station every 30-60 seconds. Missing a bus or train is incredibly annoying when you have to wait another 10 or 15 minutes (at best) for the next one.

4. Increased capacity compared to bus routes or light rail.

5. Quick time-frame for construction. Time-frame of months instead of years.

6. All electric. Could be coupled to solar or wind.
7. Scenic views. The viewpoint from these would be second-to-none.

8. The ability to run these routes over existing right-of-way would enable planners to build routes that are most demanded instead of having to settle for which routes would be most feasible cost-wise.

9. Building an entire system would yield benefits that are more than the sum of the individual parts (5 interconnected lines will bring more passengers than 5 individual lines). This is something that no city has been able to do with light rail.

**The Proposed Burnaby Mountain System**

Burnaby Mountain could soon have a gondola line serving Simon Fraser University and the rapidly-growing community of UniverCity. The SFU Community Trust has put forward the concept of an estimated $68.9 million project that would run between the Production Way SkyTrain station and the transit loop at the east end of the SFU campus. Trust CEO Gordon Harris said a gondola transit system would improve reliability and travel times to and from Burnaby Mountain, and reduce the greenhouse gas emissions currently produced by the fleet of diesel buses that run up and down the mountain.

![Image of Burnaby Mountain System](image)

**Figure 7 - The Proposed Burnaby Mtn. System**

Travel time from Production Way to the current transit loop would be 6 minutes - not the 14 (minimum) it takes by bus. Operating cost is around half that of buses - and the capital cost is not much more than the $50m it will cost for a replacement fleet of buses. Ridership is currently around 20,000 a day. Obviously it will be much better if the gondola is integrated into the Translink fare system than run privately. One major advantage of the aerial tramway is that it can operate in snow and not leave people stranded on the mountain top.
Conclusion – We Should Be “There” By Now

Doing nothing is not an option. Our society is facing need to fundamentally change how we conduct “business as usual” in terms of energy use and environmental sustainability. There will never be the “best time” or “enough money” to tackle these issues, but “now” is all we have. We can’t plan for and provide for the future “later.” In a sense we tell each other the story of the frog in the slowly boiling water, never believing that it is our water.

There is no one “solution” to our energy and transportation problems. At best, this proposed tram system may be only a 20-35% solution to our transit needs, but even that would represent a significant reduction in oil used, pollution emitted, and lives damaged or lost due to road accidents.

My idea for a safe, convenient regional system may not be everybody’s cup of tea. I’d love to keep my red sports car forever too. Many car- and road-based trips will still be needed and those, for example, with a fear of heights my not want to ride the system – even though the average height will be only about 50 feet.

Please remember, that this is not about you and me and our immediate transportation needs – it’s about what is good for the next two generations. Perhaps after that the long-awaited energy solutions based on fusion, “renewable energy,” or “clean” coal will come on-line. We are facing a situation of “death by a 1000 paper cuts” in terms of gas costs, pollution, and global warming. In turn, we need to devise thousands of small-scale solutions that are tailored to address our local needs rather than rely on having massive single source, one-size-fits-all solutions.

One of the only sure things is that we will be judged and held accountable for our actions and yes – maybe even more for our “in-actions” in the face of the need to change. One of the points of this proposal is to make sure that we, the frogs, know when it’s time to jump out of the boiling water (and to have a safe place to land) before we end up as frog soup.

This system – or one that satisfies the requirements to move people cheaply at low risk and with a low carbon footprint – needs to be built soon. This aerial tramway system could be engineered, designed, and made “shovel ready” in a few years and built within the decade – in time to make a difference for this and future generations.
Thank you, your comments have been received and will be included as part of the final meeting archive for Friday’s Transportation Committee meeting.

Michelle Posada, CAP, TA, PM
Executive Assistant/Clerk of the Board

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From: John Jenstad <johnjenstad@yahoo.com>
Sent: Tuesday, March 12, 2019 8:01 PM
To: clerk <clerk@sandag.org>
Subject: SANDAG Transportation Committee Meeting

I won't be at Friday's meeting, but would appreciate the following comments being presented:

1) The only realistic way to significantly increase bicycle use (especially among older folks) is to provide truly safe bike lanes; i.e., physically separated from cars.

2) I see many of my fellow bicyclists riding really dangerously, so it's no wonder that some drivers resent bikes. Possibly some kind of TV or billboard or on-line campaign educating bicyclists about safe riding could be initiated.

Thanks for listening!

John Jenstad
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Unit 428
San Diego 92110