This year’s Basic Academy consisted of five information-packed days that launched Caltrans internal staff and key partners into the heart of the organization’s mission, initiatives, and future action. Being a part of this Academy helped me network with key Caltrans officials from Districts all across the state and I left Sacramento with a much better understanding of what the future will hold for transportation planning in California.

**History of Transportation:** We kicked off our Academy with a speech by Heinz Heckeroth, a historian, former Deputy Director of Caltrans, and founder of the California Transportation Foundation. He was instrumental in designing many of Southern California’s freeways and reminded us of Caltrans’ legacy of driving economic development and job opportunities. His time at Caltrans was marked by building and expanding many of the major freeways that we use today such as the Santa Ana Freeway (I-5), the Santa Monica Freeway (I-10) and the San Diego Freeway (I-405). As time went on, engineers began to learn from past mistakes. One of the first modern freeways, the Arroyo Seco Parkway (Pasadena Freeway), which connects Downtown Los Angeles to Pasadena, was built without breakdown lanes or shoulders and featured sharply-curved off-ramps which made them treacherous to speeding motorists. Today’s freeways feature much more advanced styling and safety. Heinz’s intro was also important because it showed that Caltrans singular focus on roadbuilding is no longer the case today. Caltrans portfolio is much more diversified than ever before.

**Future of Caltrans – 2017 and Beyond**

Chris Schmidt – Chief of the Transportation and Planning Division shared with us the future of Caltrans. The planner, not the engineer is now in charge. He explained that Caltrans is no longer in the businesses of building freeways and adding general purpose lanes, but is now using funds for asset management, maintenance, implementing ITS, improving safety for both motorists and workers, focusing on congestion mitigation through HOV/HOT conversions, and BRT/freight lanes. Concurrently, one of Caltrans five goals is, “Make long-lasting, smart mobility decisions that improve the environment, support a vibrant economy, and build communities, not sprawl.” This is an important point because Caltrans is aware of the damage that many urban freeways have done to separate communities, and the induced demand that is associated with roadbuilding. They are planning with an eye on sustainability.
Important Transportation Laws in California

Funding is one of the most important aspects of transportation planning and Caltrans monitors how new state laws will impact its operations. During the Conference, many speakers spoke at length about what the laws mean for the future in terms of projects and funding.

SB1 – This law passed without much fanfare in April of this year, but is a tremendous milestone for transportation funding in the state. The law will add an additional 12 cents per gallon to the gasoline tax (30 cents total), and increase the annual vehicle registration fee from $25-$175. A new annual $100 fee on electric vehicles starting in 2020 will also be phased in. This will lead to an additional $52 billion in revenue over the next decade. Caltrans is very proud of this opportunity to move beyond a simple “Fix It First” policy of repairing potholes and resurfacing streets. Now they can focus on large-scale bridge and highway repairs that have been put off for a long time due to budget cuts stemming from the Great Recession. The funds will also be used to make the agency more environmentally friendly: for example, using e-construction supplies such as computer tablets on work sites instead of paper plans, using Tier IV low emission construction equipment to meet air quality standards, and converting fleet trucks and cars to electric vehicles complete with electric charging stations. At the same time, Caltrans realizes that it needs to be transparent and show the public that it can use this “gift of public funds” to deliver its promises on-time and on-budget.

AB 32 – This bill, passed in 2006 and signed by Governor Schwarzenegger, aims to cut greenhouse gas emissions to 40 percent below 1990 levels by 2030. This can be accomplished through investment in renewable energy in stationary sources (wind, solar, and hydro) and switching to Zero Emission Vehicles (ZEVs) such as personal vehicles, fleet taxes and buses, as well as passenger and freight rail. Additional provisions of AB 32 include the “Low Carbon Fuel Standard” that requires a cleaner blend of gasoline for passenger vehicles and a cap and trade program that rewards energy-efficiency retrofits and becomes stricter over time.

SB 375 – This is an important climate change law signed by Governor Schwarzenegger in 2008. It requires land use policy to be tied together with transportation planning when local governments and Metropolitan Planning Organizations create their general and long-term plans. The MPO for Orange
County is SCAG, the Southern California Association of Governments, and they are responsible for working with regional transportation agencies, such as Orange County Transportation Authority, to publish a Sustainable Communities Strategy (SCS). The SCS or Regional Transportation Plan shows how land use, housing, and transportation will come together to meet greenhouse gas reductions guidelines from AB 32. One strategy, known as complete streets, features roadways designed for all users (pedestrians, bicyclists, transit, and cars) rather than just cars alone. A complete street allows people to move around their neighborhood without having to get into their car, thus cutting the amount of engine cold starts, idling, short-distance driving, need for parking, and overall emissions.

**SB 743** – This law was signed into law in 2013 by Governor Brown. It calls for new transportation metrics in the state. The common metric is Level-of-Service (LOS) which measures congestion, capacity, and through-put and aims to speed up cars moving through an area. The problem with this metric is that building and expanding more roads to improve LOS creates “induced-demand” where new roads lead to new trips and eventually even more congestion. SB 743 calls for a new metric “Vehicle Miles Traveled” or VMT to be used in lieu of LOS where the aim of development and transportation policies is to decrease the number of miles and automobile trips made all together. This is done by building things closer together, such as mixed-used development, and walkable neighborhoods where shopping, homes, and jobs are all in close proximity. One feature of SB 743 is transit-oriented development. TOD involves building homes and apartments within ½ a mile of a transit stop to reduce car dependence and make neighborhoods more livable. Another

**Opportunities/benefits in shift from LOS to VMT**

1. Remove a key barrier to infill, TOD
2. Streamline transit and active transportation projects
3. VMT is easier to model
4. VMT is already in use
5. Reduction in infrastructure capital and maintenance costs
6. Attack regional congestion more effectively
7. Health benefits (active transport & transit trips)
8. GHG reduction
feature of SB 743 is to promote active transportation such as bike lanes and improved sidewalks/crosswalks for pedestrians. Lastly, infill development is streamlined and exempted from certain aspects of the CEQA process (parking studies and aesthetics).

**Active Transportation Projects:**

Ann Mahaney, Chief of the Smart Mobility & Active Transportation Branch spoke with us about the benefits of complete streets projects to improve the pedestrian and bicycle experience. An important aspect of complete streets which oftentimes gets overlooked is the need for ADA-compliant ramps and obstacle-free sidewalks for wheelchair users. Regarding funding, we also looked at the common complaint that pedestrians and bicyclists don’t pay their fair share in user fees.

“Bicyclists don’t pay taxes to use the roads. Why should my tax money go to bike projects? They should pay for it themselves.” – Angry Motorist

• 0.03% of all projects in the state are bike only.
• 0.02% are pedestrian only. 0.14% are both.
• 97.2% are cars only.

Relative Social Cost for a 10-mile trip
• Car = $1.20
• Bike = $0.05
• Pedestrian = $0.02

It’s clear from the data that cars and automobiles receive most of the funding and benefits, yet cost much more to maintain year after year.

**Climate Change & Roadways**

Dillon Miner, Associate Transportation Planner at Caltrans HQ, spoke to us at length about climate change implications to the roadway network. We even completed an exercise and calculated a cost-benefit analysis to see if it was better to rebuild a bridge several feet higher to allow for storm surges. In general, many state bridges and roadways need to be retrofitted and raised for the expected sea level rise from storm surges due to climate change. This can range from about 4.6 – 6 feet in San Francisco, as an example.

California also has 16 different climate zones. The pavement types need to be adjusted for each region’s unique climate and the different impacts in climate change. For instance, San Francisco will deal most with sea level rise, Sacramento with heat and drought, and Tahoe with more storms and algae bloom. Things built today must stand up to the 100-year-storms that are becoming more frequent. Vulnerability analyses need to be conducted on trees and shrubs that
Caltrans plants. To put things into perspective: It cost the state over $900 million in 2016 to fix and repair roadways that were affected due to storms and violent weather.

**Congestion Reduction Strategies**

In order to lower emissions, Caltrans is looking at ways to reduce congestion and increase the flow of vehicles traveling on roadways. One strategy is to implement **Smart Ramp Metering**. Ramp meters are a common sight on SoCal freeway on-ramps during rush hour. They turn on during peak rush hours and stagger the volume of cars merging onto the freeway to keep traffic flow consistent. If too many cars enter at once, this will decrease speeds for all users and degrade LOS. However, current meters are usually nothing more than an on/off switch and are not ‘smart’, i.e. they do not react when an accident occurs or turn off during a holiday when traffic volumes are lower. Caltrans is in the process of installing smart meters at on-ramp entrances as well as adding carpool lanes on on-ramps (this is already common in LA/Orange County, but not Sacramento).

A second strategy for reducing congestion was discussed by City of Sacramento Principal Planner, Sparky Harris. Sparky presented “The Grid 3.0” Plan which calls for a **layered-network** approach to solving Sacramento traffic problems. I really like this idea because it is a version of complete-streets, but separates the users by mode split. Because cities have different needs, and it is expensive to make every street a complete street, the plan calls for certain roads to work better for one mode than another. For example, I Street in Sacramento is a one-way street running west to the 5 Freeway and is a preferred street for automobiles. J Street has a Class II bike lane on it and is preferred for bicyclists and pedestrians. K Street has light-rail moving through it so transit is a priority on this route. All streets are one block away from each other so it is easy to transition from one mode to another to make sure all transportation needs are met.

“The layered network approach assures that all modes are addressed in the larger system of roadways, but acknowledges that trying to serve competing modes on individual streets sometimes fails to result in facilities for either. A layered network prioritizes certain modes on certain streets, providing continuity for the chosen mode while accommodating other modes or encouraging use on parallel streets. Providing select treatments for a prioritized mode on select streets can improve efficiency for that particular mode while ensuring increased safety for all modes.” – Grid 3.0 Plan
As a follow-up exercise to congestion reduction, we completed a group Traffic Management exercise looking at a road network of an imaginary city and ways to improve congestion. Some steps to improve connectivity included:

- Extending the commuter rail line to the Airport to take cars off the road
- Building a bike lane running from the State University to the north part of town so that students/faculty can bike to campus rather than drive
- Removing extraneous interchanges that are too close together to reduce merging and choke-points
Land Surveying

Caltrans also has a robust land surveying and photogrammetry department. It must deal with right-of-way land acquisitions during expansion and will buy property at market rate if a new lane or road will encroach on an owner’s property. Interestingly enough, during the Great Recession, Caltrans was able to kill two birds with one stone by buying up housing that encroached on road projects and also help out homeowners who were underwater on their mortgages. They paid the mortgage differential so that owners were able to sell the property without owing anything. In some instances, the program has put families into superior living conditions with more space and amenities (i.e. a family of 5 going from 3 bedrooms to 4). Of course, all laws for eminent domain were followed to make sure that property owners were justly compensated.

Surveying is incredibly important to the planning process because the land must be measured for subsidence, or sink rate. Sherry Toutges, Chief of Land Surveys Training mentioned that the land used to build California High Speed Rail needs to be solid to make sure there is no subsidence later on.

SAFER Design Philosophy – Just like Vision Zero is a metric used by cities to eliminate pedestrian fatalities on busy roads, Caltrans has made the safety of their workers a high priority by addressing improper placement of roadway signs and traffic signal boxes, reducing the need for landscaping and upkeep, and keeping maintenance workers out of harm’s way. Deputy Directive DD-103 “Worker Safety on the State Highway System” details these policies.

In some cases, the SAFER philosophy also complements sustainability efforts. Removing shrubs along roadway shoulders cuts down on the amount of water needed for the plant life and also removes the risk of a worker who has to go onto the roadway to mow and maintain the shrubs.
Sacramento: A Case Study

Attending the Caltrans Academy allowed me to visit Sacramento for the first time and explore the urban planning challenges and solutions unique to the area. Downtown Sacramento is laid-out on a grid system. Streets run north to south from A to W streets and this area is bordered by the 5 and 80 freeways. Streets run west to east from 1st to 29th street. For the most part, the area is full of four-way intersections and that is why locals affectionately call it “The Grid.” The entire area is very walkable and bikeable and one doesn’t need a car to get around. Directly east of Downtown is a hip area called Tree-Lined Street in Midtown, Sacramento
Midtown where many Victorian and Craftsmen homes line the streets shaded by large trees. This area features traffic circles at intersections, lower volumes of traffic, and has great street life boasting restaurants and cafes.

Sacramento is much more concentrated and walkable than Orange County and has less traffic due to a smaller population and lower cost-of-living. Areas are rapidly gentrifying due to an influx of new-comers from the Bay Area seeking a better quality-of-life. The completion of the Golden 1 Center, a recent mega-project where the Sacramento Kings play, has injected a lot more life into the Downtown area. A mixed-use condo and several office buildings are still under construction next door.

Bicycling is really taking off in Sacramento. I was fortunate enough to use the city’s new bikeshare system on the first day that it opened. For $4 an hour, users can rent a bicycle and ride around town while getting some exercise. I also had the pleasure of meeting several members of the Sacramento Area Bicycle Advocates (SABA) group who were painting a pop-up separated bike lane for an open-streets festival.

Sacramento offers a lot of promise and appeal, but is not without its problems. The Downtown area has a very large homeless population camped out in Cesar Chavez Park across from City Hall. Though there is an extensive light rail system in operation since the 1980s, I found very few people who actually admit to using it. Most prefer to bike, walk, or drive. Sacramento Regional Transit District’s website needs an overhaul to be more user-friendly, and the system also doesn’t connect to the airport yet, but a $1 billion extension has been proposed. Lastly, the 5 Freeway cuts off the City from its treasures such as touristy Old Sacramento and the recreation trails along the Sacramento River. A freeway cap has been suggested to connect Downtown with the River as this is a very common problem in other major cities. Better pedestrian connections from the Sacramento Valley Station (Light Rail) to Sacramento Station (Amtrak) to Old Town and Downtown are also being looked at since traffic volume is very high in that area and the corridor has a very disjointed feel. Yet despite these challenges, overall the outlook for Sacramento is very positive and the city is the fastest growing in California.
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Further Reading & Useful Links

Understanding SB 743
https://www.opr.ca.gov/s_transitorienteddevelopmentsb743.php


VMT vs. LOS
https://www.sonoma.edu/ensp/docs/PlanningConference/planning_conference_2014/vmt_vs_los.pdf
https://www.edf.org/climate/california-leads-fight-curb-climate-change

SCAG 2012 RTP/SCS

CARB SB 375 Explanation
https://www.arb.ca.gov/cc/sb375/sb375.htm

“Fix It First” Policy
https://www.planetizen.com/node/74687

Caltrans SHOPP
http://www.dot.ca.gov/hq/transprog/shopp.htm

SB1

Winter Storm Damage
http://www.scpr.org/programs/take-two/2017/04/06/56004/fixing-california-s-roads-caltrans-puts-winter-sto/