Study

Review of the Data, Methods, and Assumptions of SANDAG's 2021 Regional Plan for Transportation

Prepared by:
San Diego Taxpayers Educational Foundation

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SAN DIEGO TAXPAYERS EDUCATIONAL FOUNDATION

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I. Taxpayer Summary

Introduction

In December 2021, The San Diego Association of Governments' (SANDAG's) 2021 Regional Transportation Plan (RTP) was passed by the SANDAG Board. Therefore, between now and 2024, San Diego voters will see numerous proposals and ballot measures come before them proposing taxes and fees to support this extensive transportation infrastructure plan. The RTP requires $163 billion through 2050 to reshape San Diego's transportation system. This is an update of the broad 40 year plan published in October 2011 outlining the vision through 2050. It promises to reduce traffic congestion, reduce greenhouse gas emissions (exceeding the state on target reduction rate mandate by 1%), and increase safety on roads by making public transportation more accessible and more efficient for everyone, along with adhering to social equity requirements and goals.

The purpose of this report is to assess the data, methods, and assumptions that SANDAG used to complete the 2021 RTP and offer an impartial analysis on whether the data, methods, and assumptions are valid. We offer this assessment so that San Diego County taxpayers know what they can rely upon to make their own informed decisions on tax or fee proposals that come before them related to this RTP. Further, the San Diego Taxpayer Education Foundation (SDTEF), the non profit research arm of the San Diego County Taxpayers Association (SDCTA), offers a literature review on the relative "progressive" and "regressive" natures of various funding mechanisms to support transportation infrastructure, development, and operation so the taxpayer may evaluate the sometimes unintended consequence of varying fee structures on themselves, their community, and its members.

In recognition of the limited time everyone has, this paper includes substantial amounts of supporting documents and information in the appendices, which relate to information shared in the main body. The Summary of Findings Section provides this summary at an even broader level.

How can this paper help me, the San Diego taxpayer?

SDTEF sincerely hopes this paper helps all interested taxpayers feel better prepared to understand aspects of SANDAG's RTP, evaluate the legitimacy of its foundational research and assumptions, and assess its associated funding streams, most of which would require a ballot initiative and a vote by the people. SDTEF further hopes to continue sharing relevant information about the taxes and fees that are put before the people and the degree to which they may be progressive or regressive and what things have been learned which can mitigate this. Briefly, the term progresssive tax or fee generally means that the tax has a greater impact on higher-income individuals than lower-income individuals, whereas regressive taxes tend to be the opposite when they have a greater impact on lower-income individuals as compared to higher-income individuals.

This paper will also discuss research and academic terms like *reliability*, *validity*, and *sensitivity*. Broadly speaking, *reliability* refers to repeatability or consistency (i.e., Do you get the same results when you measure the same thing?). *Validity* refers to accuracy (i.e., Does your scale tell you your true weight or is there an error in it?). And *sensitivity* refers to how well small but significant changes are noticed and included in the measurement. For instance, Credit Cards typically charge a variable interest rate on balances not paid at the end of the month, which then impact the overall cost of the purchase. The factors that impact that variable rate demonstrate how sensitive the credit card's interest fee structure is. We will refer to all of these things as well as the idea of the *cone of uncertainty* which generally means that the farther into the future you are predicting a project, or the earlier on in the project planning, the less certain one can be of the outcome. The certainty of the outcome (timing, final cost, final version) becomes more clear and precise as completion nears. All of these will be reviewed in slightly greater detail in the **Data and Methods** section of the paper.

This paper will provide a very high level overview of the background of the problem that San Diego transportation infrastructure is facing, the proposed RTP, and the proposed funding mechanisms; an evaluation on the legitimacy of the data, methods, and assumptions underlying the plan and resultant evaluations of the legitimacy of aspects of the plan or funding; and a brief literature review evaluating the progressive or regressive approaches and ways to mitigate this. This paper will point to source materials for further information and will provide additional supporting materials and analysis in the appendices. This paper will highlight areas of ongoing concern with respect to data, methods, assumptions, or funding streams.

The RTP and its associated research, funding, and implications are complicated. We hope this provides a starting place and points taxpayers in useful directions if they would like to find out more as they ready themselves to cast their votes.

<u>What are the limitations of this paper as far as helping me make decisions when it comes to voting on any future tax/fee proposal to pay for this plan?</u>

This paper *will not* instruct taxpayers on how to vote on any future tax or fee proposals. This paper will not explain exactly how any individual part of the plan will impact any particular taxpayer due to the complexity of factors that go into an individual's decisions and because it is difficult to tease apart individual components of the plan as the RTP is written. This paper cannot provide exact quantitative likelihood of any proposed funding stream. This paper cannot provide exact quantitative confirmation of assumptions used by SANDAG in their research. This paper will not pass judgment on the overarching assumptions of the transportation needs of the greater San Diego region. Finally, this paper will not go through every detail of each set of data, each method, or each assumption underpinning the RTP, but instead through what we assess as the critical factors.

<u>Who worked on this analysis?</u>

Many thanks to the working group, who helped gather the right materials and reviewed information needed for this report:

- Denis Desmond, the Director of Planning at San Diego Metropolitan Transit System
- Dr. Ali Freedman, the Research and Technical Director at the San Diego Taxpayers Educational Foundation (SDTEF)

- Haney Hong, the President and CEO of the San Diego County Taxpayers Association (SDCTA)
- Alina Kureshi, Intern at SDCTA
- Eun Park-Lynch, the Chief Financial Officer at NCTD
- Katie Persons, the Senior Strategic Planner at North County Transit District (NCTD)
- Tina Sohrabi, Intern at SDCTA
- Dr. Glen Sparrow, Professor Emeritus at San Diego State University (SDSU) and a member of SDCTA

Reviewing SANDAG's public information about the 2021 RTP, the working group met regularly to discuss the reasonability of SANDAG's assumptions and estimates. Members of the working group also consulted with experts and professionals in finance and transportation in supporting the review.

It is important to note that SANDAG staff collaborated with SDTEF staff throughout this analysis to answer questions and provide additional supporting documentation as they were able. SDTEF expresses its gratitude to the SANDAG staff.

Background

What is SANDAG (San Diego Association of Governments) and what is a Regional Transportation Plan (RTP)?

SANDAG stands for San Diego Association of Governments, a regional public entity which consists of mayors, council members, and county supervisors who represent various municipal governments whose leaders voters elect. Additionally, SANDAG is advised by representatives from, for example, the California Department of Transportation (CalTrans), the San Diego Metropolitan Transit System, and the North County Transit District. From a definitional standpoint, SANDAG is a Metropolitan Planning Organization (MPO) which holds them accountable to adhere to a multitude of State and Federal requirements in order to receive certain funding allocations. SANDAG makes essential decisions for San Diego, one of which is what San Diego County's transportation should look like into the future. There have been regional transportation plans in the past several years, but the 2021 Regional Transportation Plan is a total reimagining of transportation as it is right now in San Diego with an eye towards long term growth and sustainability. What makes this plan different from previous ones is the new Five Big Moves and the model that is the backbone of the plan. The scope in time, money, and vision is also noteworthy. Updating Regional Transportation Plans every four years is a Federal requirement.

Why do we need a Regional Transportation Plan (RTP) and what does it cover?

In San Diego, like most parts of the country, our transportation infrastructure has been rapidly approaching a crisis of sustainability. One of the most universal reasons for this is based on the old manner of funding transportation infrastructure, through the gas tax. That worked when vehicles were less fuel efficient and all ran on fuel. Both those factors have yielded far less revenue in every state, for universally growing demand with higher costs and more complex needs. The crisis pertains to funding for development, maintenance, and operation of

transportation infrastructure; environmental aspects including greenhouse gas emissions and plant and animal impacts; social equity with respect to access and affordability; and human wellness concerns related to air quality, high rates of traffic accidents, active commute modalities, impacts on time, stress, and quality of life.

Legislatively, there are past and current mandates related to mitigating environmental damage and city planning. Assembly Bill 32 (AB 32) required California to lower greenhouse gas emissions to 1990 levels by 2020. Senate Bill 375 (SB 375) encourages planning practices that create sustainable communities and also charges the California Air Resources Board (CARB) with setting regional targets for reducing greenhouse gas emissions by 2020 and 2035. As referenced in the prior question, SANDAG is officially identified as a Metropolitan Planning Organization (MPO). This formally brings together a sizable region to plan a coordinated, sustainable, inclusive and equitable plan that manages constituent and stakeholder needs and also adheres to required environmental goals. Transportation planning and funding is extraordinarily complicated. The reader can find a one page overview provided by SANDAG on page 14 of the 2021 Regional Plan with reference to several of the key legislative requirements to which they must adhere in order to receive needed funds. Additional primary source materials are referenced within that document and as footnotes. Overall, it is critical the reader understands and appreciates that the San Diego region has joined together to coordinate this effort lead by SANDAG as an MPO and, as such, must comply with requirements for Sustainable Community Strategies (SCS) per SB 375, compliance with Federal Civil Rights Act Title VI, environmental considerations, air quality conformity, and public participation.

SANDAG has published an extensive 40 year plan called the 2050 Regional Transportation Plan in order to address these concerns. The plan outlines the background and current state of this crisis in detail as well as the proposed plan to address it through 2050. The RTP includes elements that have already been completed and expenditures that have already occurred as this plan is a continuation of a prior plan. Of the almost $214 billion year of expenditure (YOE) plan, $28.44 billion are reported to have been spent in the 2010-2020, leaving $185.38 billion YOE for 2021-2050. The current 2021 Regional Plan shows a $163 billion dollar budget through 2050.

What are the basics of the Regional Transportation Plan (RTP)?

SANDAG's Plan is underscored by the below five key strategies:

- **Next OS** (Operating System) — Enable new and better services for residents, transportation operators, and planners through technology
- **Complete Corridors** — Provide safe and reliable travel for everyone, whether they walk, bike, take public transit, or drive
- **Transit Leap** — Build on the current transit services through new and enhanced commuter rail, light-rail, and bus services
- **Mobility Hubs** — Bring together better transit and travel options for people to explore communities without relying on a car
- **Flexible Fleets** — Include micromobility strategies, rideshare, and microtransit options that would make first- and last-mile options safer and more convenient

The plan proposes to improve on and develop a public transit network to meet the growing needs of our population, geography, diversity, economy, and environment. The plan expects to

reinforce and upgrade existing transit in key urban corridors and develop new transit projects in the most urbanized areas with a broad combination of transit modes. Projects include but are not limited to enhancing rail capacity for COASTER, Amtrak and SPRINTER; enhancing and adding Trolley, Bus, and Bus Rapid Transit service lines, efficiency, frequency, and geographic coverage; and reintroducing streetcar or shuttle service in downtown San Diego. Further, SANDAG plans to address the "first- and last-mile" issue by enhancing pedestrian crosswalks, bicycle lanes, bike and auto parking near transit, feeder-distributor buses, and ridesharing options.

Major elements of the plan also focus on highway infrastructure changes. They will be modified to accommodate buses and other transit vehicles, vehicles of varying occupancy (e.g., carpool, bus, electric) or fee paying vehicles (e.g., Express Lanes, FasTrak), and bicycle traffic. As both a port city and an International Border County, SANDAG also notes improvements and accommodations for freight and commerce, as well as tourism and airport and cruise terminal enhancements.

As a County with weather that supports an active, outdoor lifestyle, and one that is required to reduce greenhouse gas emissions, focus is also paid to enhancing walking, biking, and other active transportation modes. Safety is another consideration incorporated into the plan in terms of Safe Routes to School Strategy; safety for the elderly, disabled, and solo travelers; and reduction of motor vehicle involved accidents.

The RTP aims to reduce greenhouse gas emissions, reduce travel times, and reduce congestion along with the associated problems (pollution, stress, accidents, unpredictable travel times). In addition to elements from above, other technological improvements will support this goal. These include but are not limited to on-ramp lights that meter the flow of traffic, smart traffic light signals, and informational freeway signs about traffic flow.

<u>What is the funding plan for the Regional Transportation Plan (RTP)?</u>

Note that this paper refers to the most recently updated 2021 Regional Plan which covers 2020 through 2050 and the 2050 Regional Transportation Plan which covered 2011-2050 and therefore includes a time period that has already occurred. This results at times in different overall budget numbers.

SANDAG previously outlined estimated costs and revenues for the 2050 plan. The total expenses for this plan were estimated at approximately $214 billion in year of expenditure (YOE) dollars from 2010 through 2050 (approximately $185 billion YOE 2021-2050 due to the plan showing $28,442 billion already spent in FY 2010-2020). This is a *revenue constrained model*; therefore, SANDAG presents a budget such that expenses do not exceed revenue. They do also present an unconstrained budget model which aims to meet all projected transportation needs but exceeds the projected revenue. They do this in year 2010 dollars, and the shortfall is $48 billion.

The current 2021 Regional Plan estimates $172 billion in revenues from 2021-2050 with a breakdown into Local, Federal, and State sources. Local funds make up about 60% of the total revenue, with state and federal funds providing 22% and 18%, respectively. Revenues are predicted in three major phases - 2021-2025; 2026-2035; and 2036-2050. A good deal of this

paper deals with assumptions on these funding sources and is therefore covered later. What is important to note and covered later is that many of these funding sources are potential or proposed (32.4% in 2020 dollars), not probable or forecasted based on past and current performance (67.4%), and are sensitive to political changes and voter approval. As a result, these funding sources must be considered as only possible and are far from guaranteed.

Summary of Findings

What did SDTEF find with respect to the data, methods, and assumptions of SANDAG's RTP?

Through a deliberative process communicating with SANDAG and other professionals, as well as conducting independent literature reviews and digging into the data, methods, and assumptions, SDTEF has made a concerted effort to offer its evaluation on the legitimacy of the data, methods, and assumptions upon which the RTP is based. At times, this may be readily quantifiable (for example, something may be determined to be 95% likely), and many other times it is more qualitative (e.g., X assumption is high risk as it is a vote before the people and the people have historically been divided).

Overall, after a review of the data, methods, and assumptions, *SANDAG developed a reasonable RTP, though it contains significant uncertainties that make it difficult for individual taxpayers to understand how it affects different communities. SDTEF has some concerns over the data from the Household Transportation Survey and significant concerns on the many assumptions in the funding, but generally found the methods to be valid.* SDTEF's biggest critique of the plan is the lack of a funding prioritization plan or a clear connection between what money funds what projects, which then makes it challenging for taxpayers to understand which communities benefit and which pay for construction. Recall that the purpose of this paper is not to pass judgment on the nuts and bolts of the transportation plan from a transportation perspective, only from a research perspective to help the taxpayer evaluate the foundations of the plan. SDTEF will not offer a position, for example, as to whether the Coaster should or should not be improved as suggested in the plan, but rather whether the underlying research and assumptions that caused SANDAG to arrive at the conclusion to improve the Coaster and the mechanism for funding are reasonable or valid. The reader can find more information and specifics in the appendices.

What are the high level findings related to progressivity and regressivity of different funding ideas?

The progressive and regressive natures of different taxes and fees depend on specifics of implementation and, sometimes, depend on specific regions and how people live, work, play, and move about the County. There are some elements which, if applied in a simple fashion, may be regressive; however, when applied in a fashion that takes into account many specific variables in San Diego, they may be progressive. One example of this is Toll Roads like State Road 125 (SR-125). If the toll road was the only option to get to a location, especially if it was a corridor that served majority lower income people, it would be regressive. It would cause a greater impact to lower-income people than higher-income people. However, if there are other options to get to the same location with lower financial outlay and, to continue the example, was not a corridor that served majority lower income people, it could be neutral or progressive. Much more detail and analysis is provided later in this paper and in the appendices. The funding schemes and their

application is complex and there is a lot of research on different applications and outcomes locally, regionally, nationally, and internationally.

What are the ongoing concerns related to the RTP?

Overall, after a review of the data, methods, and assumptions, SANDAG developed a reasonable RTP, though it contains significant uncertainties that make it difficult for individual taxpayers to understand how it affects different communities. It further begs the question how we do governing and transportation planning because of the breadth of our region, diversity of our constituents, and scope of the task, but that is outside the scope of this review.

That said, if you are voting on a future tax or fee proposal to pay for this plan or parts of it, the most important thing to evaluate in any single measure you see is to understand the difference between when you and/or the communities you care about start paying for a project or improvement and when you or they should expect to see the anticipated positive impact. Further, you will want to evaluate how or if the fee structure changes once the project moves from development to maintenance (e.g., tolls implemented to pay for the construction of the Coronado Bridge that were removed once the building was completed versus fees to construct electronic toll booths that are replaced by the fee for use once implemented). It is also important to understand clearly what funds are to be used for, including what specific projects it will support, and have some ability to evaluate how that project impacts you and different communities and community members of concern to you. Additionally, it is critical to know how likely a project is to be completed if the funding is approved. At times, projects may not proceed as intended not for lack of funding, but due to other issues - land use, environmental, political changes, societal needs changing, etc. SDTEF has composed a list of questions the taxpayer may use as a worksheet, of sorts, to evaluate associated funding measures. This worksheet can be found in Appendix 1.

SDTEF has significant concerns that there is no clear prioritization scheme for such a complex plan and complex funding. Different funding streams are not clearly differentiated as to which projects they support. As such, this plan must be evaluated as a whole, yet it is too complex and long range (in compliance with Federal mandates) to be evaluated as a whole in a meaningful way. Taxpayers are unable to discern what projects will occur including their respective start and finish dates in relationship to when the taxpayer will start paying for the project and when or if they will ever stop paying, which sections of the project more directly impact them, and what will happen if there is insufficient funding to realize the full scope of the plan.

SDTEF has significant concerns that many of the funding sources lack a high degree of confidence in ability to secure them. Many are subject to votes and/or political winds. Many others are predicted based on past availability of State or Federal funds and either a proportional, project-based, or proposal-based allocation which are far from guaranteed. It seems highly unlikely that all of these ballot measures, grants, or possible funding streams will come through. An example is that potential revenue sources include Road Usage Charges (RUC) or Vehicle Miles Traveled (VMT) Fees at the State ($4.2 billion) and Local level ($14.2 billion). The State is operating a pilot for this, but there was bipartisan push back from SANDAG Board members on the local VMT days before the final vote. The local portion alone represents 8.7% of the total $163 billion budget which is in peril at the SANDAG Board level, which is numerous steps before it could be realized.

SDTEF does not have significant concerns with these estimates of already approved or in place taxes, in general. Several funding sources are estimated based on past behavior and additional factors. This includes forecasted sales tax revenue such as the existing Transportation Development Act quarter-cent sales tax and the existing TransNet sales tax revenue.

SDTEF has some concerns with the potential problems with the representativeness of the data from the Household Transportation Survey given how much weight may be put on those data as inputs into the modeling.

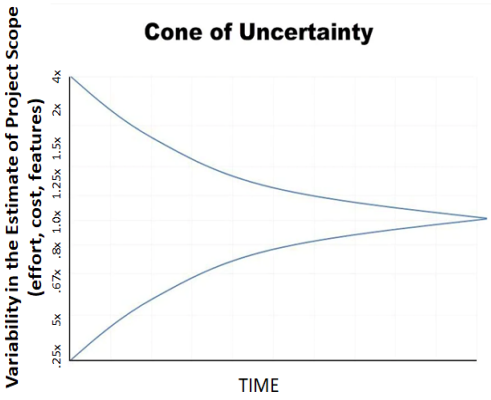
SDTEF has significant concerns about this forecasting of costs and the lack of additional resources to cover projects, again without a prioritization scheme for projects expressed thus far by SANDAG. It is typical that projects take more time and more money than expected. In this plan, SANDAG shows a potential excess of revenue (neary $173 billion) compared to budgeted expenditures ($163 billion). SANDAG reported to SDTEF that the surplus was to account for changes in revenue based on forecast. SDTEF agrees that this is important to do; however, SDTEF believes the margin of error is safer at 15-25% over expected costs. It is typical in construction to buy 10% more than you need. In this case, we are starting at 15% more due to the protracted nature and scope of this plan and ranging up to 25% to account for the many revenue sources that are far from guaranteed. Even a 25% planned overage may not be adequate. A cost-constrained budget such as SANDAG has put forth, does not leave adequate room for any negative turn of events. One example to illustrate this concern relates to inflation and associated assumptions with planning. Money gets more expensive, if you will, in years out due to inflation. This RTP is front-loaded with the bulk of the construction being underway and, in many cases, completed within the next 14 years. The RTP assumes spending an average of $2.8 billion per year in the first five years; $6.6 billion per year the next 10 years; and $5.5 billion per year the following 15 years. For context, the recently completely midcoast trolley line expansion cost $2.1 billion and took over 15 years to complete. The RTP generally assumes an average of 8 years to complete projects. This is a busy and very frontloaded plan with large scale development on many fronts simultaneously. In the current times, both materials and labor have been very hard to come by. Accomplishing many projects simultaneously may exacerbate these bottlenecks. All of these factors make it highly likely that projects will take longer which almost invariably means they will cost more money.

II. Overall review of analysis of data and methods

Introduction

When assessing data legitimacy, we will use statistical terms *reliability*, *validity*, and *sensitivity* to evaluate data, methods, and assumptions. Broadly speaking, *reliability* refers to whether a measure is repeatable, consistent, or reproducible. For instance, if our weight has not changed and we weigh ourselves on the same scale repeatedly (test-retest reliability) or on different scales (inter-rater reliability), we will get the same result. *Validity* generally is an indicator of accuracy and whether an instrument measures what it intends to measure. An example is if your scale is calibrated to provide your true weight, then it is valid. If it is off by 5 pounds, it is not valid.

However, if it is consistently off by the same 5 pounds every day, it is reliable. As you can see, something can be reliable without being valid, but nothing can be valid without being reliable. *Sensitivity* refers to an instrument's ability to identify small but significant or meaningful changes. This is particularly complex and one basic example is, if a budget forecast uses 2% inflation index for a 10 year projection and the actual inflation index is ultimately 2.5% per year, there will be a significant difference in the budget versus the actual. That said, if the inflation rate turns out to be 2% for the first 9 years and 2.5% only in the final year, the projection will still be very close to accurate. It is as if you headed out on a boat from San Diego to Hawaii. If you start out on course and only get shifted one degree off course within the last mile, you'll be able to see and make course corrections. However, if you make that one degree shift as soon as you leave San Diego, you will wind up very far off course. This can be a difficult idea to understand, but it is what really comes into the equation when we look at assessing assumptions and risk. It is impossible to predict the future with certainty, and every assumption comes with a chance of being exactly right, and many more chances of being in the ballpark or way outside of left (or right) field.



The image helps illustrate what some refer to as the *cone of uncertainty*, that at the beginning of a project, the ability to accurately predict outcomes is relatively poor and gets better and better as project completion nears. The unknowns and assumptions that must be made to forecast come with inherent risks and assumptions that are subject to many things - some mathematically predictable to a good degree, others not, like the onset of a pandemic wreaking havoc on supply chain, lifestyle, freedom of movement, healthcare crisis, international and domestic travel, etc. (Modern Analyst, 2022).

Household Travel Survey (HTS) concerns

SANDAG points to the Household Travel Survey (HTS), conducted in 2016-2017 as its most significant data source in evaluating transportation patterns, use, needs, etc for San Diego County residents. It includes data from 6139 households and was collected by an independent research firm, Resource System Group Inc. Unlike previous surveys, this was conducted primarily through two apps in smartphones - rMove to track travel and rSurvey to collect information from respondents about their travel. Those who used the apps reported data for one week. Those who did not were able to report daily for one week by internet or phone. SDTEF reached out to SANDAG in August of 2021 and again in December of 2021 and January of 2022 with numerous questions about the HTS data collection process, however, no answers were provided on these questions. These questions are in Appendix 2.

SDTEF has been left with a number of outstanding questions as to the representativeness of this data. It is always impossible to have a subset of a full set be sampled and get 100% accuracy in the representation of the whole. And yet, there are mathematical models that help ensure that if a certain number of people are asked and subsets are represented (e.g, by race, language spoken,

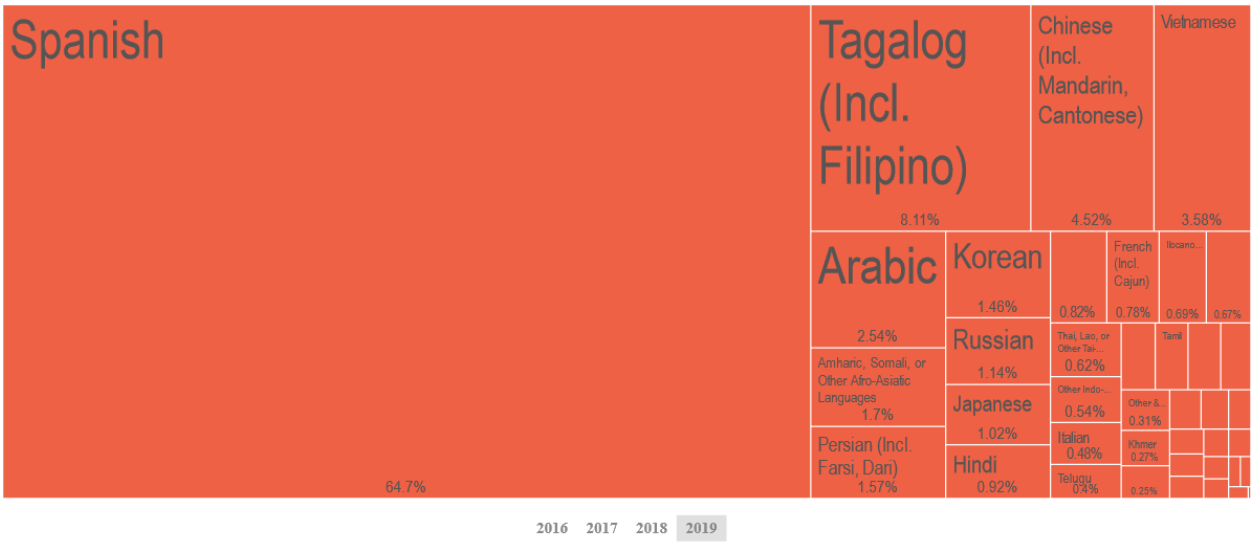
age, educational attainment, area of residence, etc), that the resultant data can be reasonably representative. *SDTEF has some outstanding concerns about the data collection sampling process.*

To begin with, the survey was largely conducted through smartphones. According to the Pew Research Foundation, in May of 2011, 35% of American adults had smartphones. This rose to 70% in May of 2016 and 85% in February of 2021. So at the time of the HTS (2016-2017), roughly 70% of American adults owned a smartphone. This underrepresents approximately 30% of the adult population. Groups less likely to own smartphones include the elderly, people in lower-income brackets, people who have attained less formal education, and those residing in more rural areas (Pew, 2021). We further assume that people with greater privacy concerns and minimalist lifestyles may also be less likely to own smartphones or to enable many features on them including location tracking and the use of apps in general. This likely means some of the very groups SANDAG is concerned about disenfranchising were underrepresented in the HTS. An extension of this is that many smartphone users have limited proficiency with their devices and may not freely download or use apps or tracking services and many smartphone users do purposefully limit the information they choose to make available for privacy or other concerns. This leads to the concern that a sizable portion of the 70% of adults who have smartphones still may not be adequately represented by this method of data collection. *This is a concern about the validity and sensitivity of the representativeness of this data.*

SANDAG made efforts to mitigate this which consisted of suggesting household members share a smartphone with another household member - the challenges with this are fairly clear including who is being tracked, how valid is the data. how reliable is the data, etc. They also allowed for web-based or phone in survey responses. This naturally is predisposed to less accurate reporting, less frequent reporting, and lower likelihood of reporting.

SANDAG made this survey available in English, Spanish, Traditional Chinese, and Simplified Chinese. That covers the 1st, 2nd, and 4th most frequently spoken languages in San Diego County, respectively. There is no indication that this information was collected from people who prefer to communicate in the languages spoken with the 3rd, 5th, and 6th greatest frequency in San Diego County, namely, Tagalog (3rd), Vietnamese (5th), or Arabic (6th) nor from those who aren't adept at reading or who speak other languages. 36.7% of San Diego County citizens are speakers of a non-English language, which is higher than the national average of 22%. *This is a concern about the validity, reliability, and sensitivity and, therefore, the representativeness of this data.*

The below graphic shows the breakdown of Non-English speakers in San Diego County as of 2019 (Data USA, 2021). The link provides access to an interactive graphic where you may access additional information.



https://datausa.io/profile/geo/san-diego-county-ca#languages

SANDAG reports that they oversampled certain subgroups for the purposes of quality and representation. They report oversampling transportation users, Hispanic people, Spanish speaking people, low-income individuals, and "other". It is not clear the complete demographics of those sampled and how they compare to County demographics or ridership demographics, nor what other is. It would seem there was not adequate attention paid to sampling the elderly, differently abled (physically or cognitively), non English/Spanish/Chinese speaking, people with limited literacy, or non smartphone users. People without homes are also frequent transport users and it is not clear what outreach was done to gather information from that population. Given the goal of ensuring we understand the transportation needs, especially of those who are likely to rely on public transportation, so that it is developed according to current and projected needs, *this is a concern about the validity and representativeness of this data.*

Several points of sampling bias may be present which include but are not limited to that this was done through smartphones and participants were individuals who had previously participated in a similar survey. The group of respondents who chooses to repeatedly participate in such surveys may have group differences from those less likely to participate. Those may be further magnified by those choosing to participate in similar surveys repeatedly. For instance, those willing to have their location tracked or report their locations are significantly different from those who are more protective of that information. Another example, those with less available time may be less likely to participate in research. *This is a concern about the validity and representativeness of this data.*

There is a significant sensitivity risk to the data if important groups were underrepresented. For instance, if the elderly are asked less, or asked through means that they are less comfortable with (e.g., smartphones), or asked through means which rely on their memories which may not be at their prime, each time we may get less and less accurate information. Add this to the other areas mentioned which call into question how representative this data is, and the end product may be farther and farther from accurate.

It should be noted that SANDAG made efforts to mitigate some of these challenges and other challenges, yet many remain. *As this was a significant source of data going into the modeling,*

SDTEF has concerns over the forecasting. Appendix 2 details the full list of related questions that were posed to SANDAG related to this which, to date, were not answered specifically.

SANDAG's Activity Based Model (version) 2+ (ABM2+)

ABM2+ is SANDAG's newest model that forecasts travel demand across the San Diego region. It simulates individual and household travel choices in 30-minute intervals. The unique feature of this new model is that it considers new trends in technology such as telework (always, primarily, or occasionally) and micromobility (e.g., last mile). All data related to the ABM2+ is available publicly and for free on GitHub. The purpose is to simulate household and individual travel choices in a manner that replicates actual behavior as closely as possible. SANDAG has continued to refine this system resulting in the current, most sophisticated version. It relies on data from SANDAG, Caltrans, and the federal government. The model has been routinely "peer-reviewed by the Technical Advisory Committee, a panel of national experts in the travel demand forecasting field." University of California Irvine's (UCI) Institute of Transportation Studies (ITS) deems the ABM2+ as "capable of simulating the Five Big Moves and its supporting policies and programs."

At the request of SANDAG, ITS-Irvine reviewed the telework assumptions that go into the ABM2+. SANDAG's Telework Assumptions Memo recommends a target for work from home based on recent telecommuting survey data. To check if the memo's assumptions are reasonable, Irvine-ITS compared SANDAG's assumptions to internal data and externally published results as well as the theoretical capacity for telework in San Diego to SANDAG's recommended telework target. The first comparison led them to the conclusion that "the base year telework target for ABM2+ is a conservative and justifiable estimate." The second comparison showed that SANDAG's assumption behind predicting telework ratios in the future is also reasonable.

A likely question taxpayers will have is how COVID has or will impact telework and associated travel demands and habits, and whether these changes will be temporary or longer term, and to what degree if longer term. It is critical to note that the impact of COVID-19 is not considered in the Irvine-ITS review or in SANDAG's telework target. SANDAG replied to Q11 in Appendix 3 indicating additional information they used to incorporate factors related to COVID and changes to telework and commute patterns. *SDTEF acknowledges that this is reasonable due to the lack of an existing alternative while asserting a need to continue to evaluate this in future modeling.*

The AMB2+ Model appears to be well reviewed and accepted by impartial experts in the field. It is reviewed regularly and considerable effort and collaboration has gone into each upgrade. Further, SANDAG has made information available on further updates to come. More information can be found here. As such, despite the concerns about SANDAG's view that COVID-19 will not have a lasting impact on telework and transportation patterns, the system is constantly evolving and being fed real time data which will lead it to be sensitive to changes. *SDTEF has no major concerns about the use of this model.*

Off-Model Calculators

Changes to ABM required reassessment of what factors are addressed and factors cannot be addressed through the ABM2+ but can be in off-model calculators. The off-model calculators were also reviewed and approved by the Irvine-ITS. *SDTEF has no major concerns with the use of the off-model calculators and recognizes them as critical improvements to SANDAGs modeling.*

Five Big Moves and Specific Projects and Programs

To address issues concerning CO2 emissions, air pollution, traffic congestion, safety, and social inequities SANDAG proposes the Five Big Moves: Next Operating System (OS), Complete Corridors, Flexible Fleets, Mobility Hubs, and Transit Leap. If approved, the plan will take its course from 2021 until 2050. SANDAG's Five Big Moves to transform San Diego's transportation system are:

Next OS will enable new and better services for residents, transportation operators, and planners through technology.

The Complete Corridors will be the backbone of the regional transportation system. With the latest technology, Complete Corridors will manage roadways to make sure traffic is smoother and safer for everyone. This is achieved through dedicated spaces for everyone and encouraging non-solo driving.

Transit Leap ensures high capacity, high speed, and high frequency transit services in the region. This is achieved by building new forms of transit or improving existing ones.

The purpose of Flexible Fleets is to offer on-demand shared vehicles (microtransit, bikeshare, scooters, and others) to travel to transit options and to travel between Mobility Hubs.

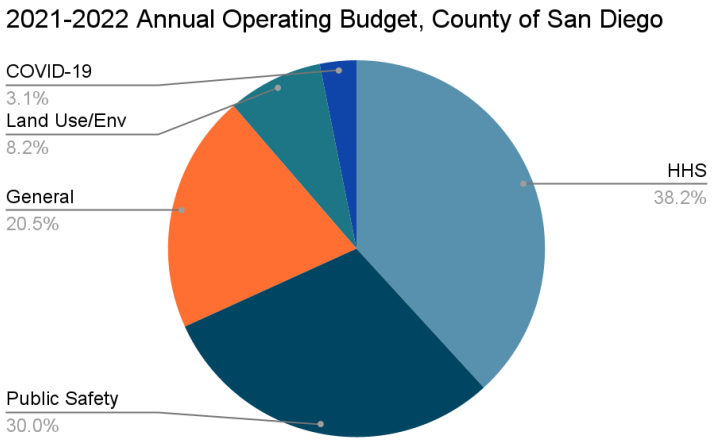
Mobility Hubs will be at locations with high concentrations of people, destinations, and travel choices. The purpose of the Mobility Hubs is to provide on-demand travel options: high quality Transit Leap Services and Flexible Fleets (for short trips).

SANDAG included in Appendix A of the 2021 Regional Plan a list of projects and programs. The details can be found in the original document linked above. SDTEF has prepared a Table (Table 1 in Appendix 4) that shows the projects and program broken down into 8 categories: "Major Corridor" improvements, Rural Corridors improvements, improvements on arterials, Mobility Hub and Flexible Fleet, Next Operating System elements, Systemwide Transit Support Services, Supporting Policies and Programs, and Unconstrained Goods Movement Projects. The next column more specifically names the project and the final column describes the project.

SDTEF is not in the expert position to analyze the strategies (Five Big Moves) or tactics (Projects and Plans) that underpin the RTP. SDTEF does not have expertise in transportation design, city planning, or transit implementation.

III. Overall analysis of funding plan

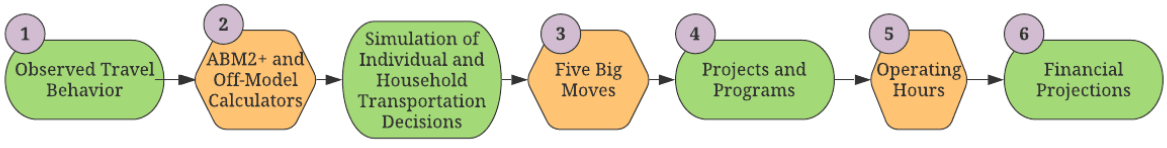
This is a plan with an extraordinary scope, much of which is to adhere to State and Federal legislative requirements; and it comes with a hefty price tag, accordingly. To put it in perspective, the 2021-2022 annual operating budget for the County of San Diego is $7.23 billion.



The SANDAG RTP total cost is estimated to be $163 billion in 2020 dollars. Divided by the 30 years, the average is $5.43 billion per year. To get a sense of the magnitude, compare $5.43 billion annually to the $7.23 billion County budget. Note that the County Budget is not responsible for funding the RTP and this is only offered to help grasp the magnitude of the plan and associated costs.

How did SANDAG calculate the costs?

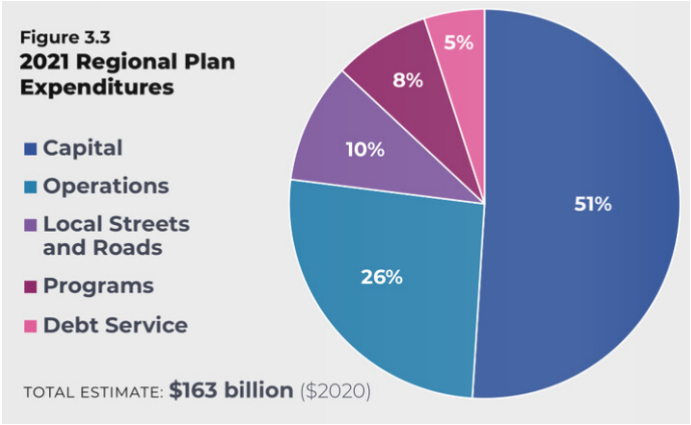
A breakdown of SANDAG's process from raw data to their financial projections is shown in the below figure. Green blocks indicate inputs and/or outputs, orange blocks indicate methods used to transform inputs into outputs, and the arrows indicate the direction in which the observed data is processed to translate into financial projections.



SANDAG has outlined estimated costs and revenues for this plan. The total expenses for this plan are estimated at $163 billion in 2020 dollars. This is a revenue constrained model, therefore, SANDAG presents a budget such that expenses do not exceed revenue.

Funds are separated into Local, State, and Federal sources. Local funds make up about 60% of the total revenue, with state and federal funds providing 22% and 18%, respectively. Revenues

are phased in in three parts, 2021-2025, 2026-2035, and 2036-2050. Of the revenue, approximately 51% is expected to be spent on capital improvements, 26% for operations, 10% for local street and road improvements, 8% for Systems and Demand Management and Active Transportation Programs, and 5% for debt service and non-highway goods movement projects.



Figures are from pages 48 and 52 2021 Regional Plan

Local revenues which are reasonably secure and *estimated* based on past revenue generation include *TransNet* half-cent local sales tax which are estimated for years out through its sunset in 2048, bond proceeds, Development Impact Fees, Transportation Development Act quarter-cent sales tax, local street and road gas tax, local street and road General Fund and Other Revenues, existing FasTrak toll revenues, Value Capture/Joint Use Agreement, Motorist Aid Services toll box fees, and projected existing public transit farebox revenue.

Local revenues which have varying degrees of likelihood are a second extension of the *TransNet* sales tax from 2048; proposed new toll roads and port of entry fees for State Routes 11, 125, 241, and Interstate 5 and 15; Ridesharing fees; regional Road Use Charges or VMT fees; public private partnerships for Transit Oriented Developments (TODs) for transit stations and streetcars; additional FasTrak revenues due to rate increases an additional miles of FasTrak roadway; and additional farebox revenue based on expansion and increases.

State Revenues assumed and estimated with varying assurance are the State Transportation Improvement Program Funds, State Transit Assistance; State Highway Operations and Preservation Program and Maintenance and Operations Program; Cap-and-Trade; State FASTLANE; Other State-Managed Federal Programs; Freeway Service Patrol; and Road Maintenance and Rehabilitation Account. Less secure funding streams from the state include a State Road Use Charge or VMT charge and Housing Revenue from SB 795 Grants or similar.

Federal Revenues assumed and estimated with varying assurance are Section 5307/5309/5310/5316/5317 of the Federal Transportation Authority Formula; Federal Discretionary Funds for a Full Funding Grant Agreement for the Mid-Coast Trolley Extensions and for other earmarked major and minor transit projects; Surface Transportation Program/Congestion Mitigation and Air Quality Improvement; Other Federal Highway

Administration funds; Federal Highway Administration Discretionary; Federal Railroad Administration Discretionary funds; Corridors and Borders Infrastructure/Freight funds; Other anticipated Grant opportunities; Transportation Infrastructure Finance and Innovation Act (TIFIA) loan proceeds; and Air Quality and Transportation Control Measures.

Most fundamentally, *SDTEF notes with significant concern the many sources of funding included that are potential funding sources, not probable funding sources*. Many of the sources require voter approval and are also subject considerably to the political winds. The current plan relies on nearly 100% of the above funding to realize the cost constrained budget plan. The likelihood of every tax or fee put before voters being passed is low and the likelihood of stars aligning politically to realize all of the above funding streams is also low. SDTEF has attempted to rate how likely each funding source is to come to fruition in Table 2 in Appendix 5.

Days before the RTP went before SANDAG for a vote, several members expressed their concern on the Road Usage Fee. These concerns joined already expressed concerns making the majority opposed to the Road Usage Charge at this time, in this iteration. The Road Usage charge accounted for 8.2% of total revenue plan and was forecasted to be collected in the final 20 years in 2020 dollars (10.8% during period FY2036-50) and SANDAG's model assumed implementation in 2030.

This ties to the other most significant concern related to the funding plan. SANDAG's RTP and SANDAG have not provided a prioritization scheme. There is no way for the voter to know what funds will be used to cover which projects or what projects are removed or reduced if funding is insufficient to cover the full plan. *The lack of an itemized expenditure plan that ties revenues to projects and the lack of a prioritization scheme are significant concerns.* A voter cannot make an informed choice based on the information provided thus far.

In summary, there are over 30 funds that SANDAG refers to but the certainty of these funding streams varies and their intended specific use per project is not clear. Full transparency may be achieved with one matrix presenting all 30 funding sources and shows:

- Type of fund (federal, state, local)
- How is the revenue generated and whether they are existing or future sources (formula, discretionary, sales tax, based on fuel prices, miles driven, etc).
- Total projected revenues
- How much of the revenues are contingent upon a future action (voter approval, legislation, local match, etc.)
- Percentage and amount of projected revenues that are already committed to existing services
- For sales tax measures, assumptions for tax levy percentage and population growth
- Sensitivity analysis, for example, for sales tax, for every X% change in population growth, the fiscal impact is $Y
- Some triaging component as to priority of each project, contingent projects, ability of projects to be scaled down if funding is not adequate, if specific funding is earmarked for specific projects

SDTEF requested completion of multiple tables in order to help elucidate this information in comprehensive and transparent form. These Tables (3-10) can be seen in Appendix 6. Unfortunately, SANDAG replied that the "requested data would require additional transportation

model runs and analysis that are beyond the scope of the Regional Plan." Once again, the reader is directed to Table 2 in Appendix 5 for a chart where SDTEF attempts to categorize the relative assurance of funding streams as unlikely, unsure, and likely.

IV. Literature Review of means and methods for transportation revenue viewed through equity lens

Introduction of concepts and terms

The term "*progressive*", when referring to taxes or fees, generally means that the tax has a greater impact on higher-income individuals than lower-income individuals, for example income tax rate brackets. Conversely, "*regressive*" taxes tend to have a greater impact on lower-income individuals as compared to higher-income individuals, for example, property tax. A *proportional* tax applies the same tax rate to all individuals regardless of their income level, for example, State income taxes in Colorado apply a standard proportional tax rate to all taxpayers.

SDTEF, as well as the San Diego County Taxpayers Association, has made a commitment to ensuring that taxpayers at any income level are represented in our work. As such, considerable time was put into this literature review. Once again, higher level information will be shared here with more information available in the **Appendices** and **Bibliography.**

Terminology can be confusing in this literature. In this paper, we will generally discuss *Cordon Fees*, *Congestion Fees* which may be referred to as *Road Pricing* or *Managed/HOT (High Occupancy Toll) Lanes* depending on where and how they are applied, and *Vehicle Miles Traveled (VMT)* or *Per Mile Road Usage Charges (RUC)*.

Cordon Fees generally refer to a specific section that requires an entrance fee in order to enter. Sometimes the fees are constant, which will be referred to as fixed, and other times they vary based on demand, which will be referred to as variable. Additionally, cordon fees can be applied in almost concentric circles, where the heart of a city is in zone 1, the next level out is zone 2, and on, typically with the rates being lower for zones that are farther out and higher (or compounded) for the center of the city. Cordon Fees may be paid at staffed or unstaffed toll booths; through transponders typically purchased by the vehicle owner and prepaid or billed afterwards (often with a resultant fee discount for being the most automated); or by phone, web, mail in, or business office options based on License Plate recognition.

Congestion Fees refer to a variety of ways to deter people from driving as much or at peak times or through certain corridors. They may use dedicated roads, such as the dedicated toll section of State Road 125 in southeast San Diego County named the South Bay Expressway. Thay may use Managed Lanes or HOT sections, some of which are dedicated lanes and some run adjacent to the free lanes, such as on Interstate 15 (I-15) in North Central and North Inland San Diego County and are referred to as FasTrak Lanes. Like Cordon fees, *Congestion Fees* or *Road Pricing* may be fixed, as they are on the South Bay Expressway, or variable, as they are in the FasTrak Lanes of I-15. It should be noted that FasTrak Lanes are free for High Occupancy Vehicles (HOV) cars which may be eligible by having two or more persons in the vehicle or as a

result of their low or zero emissions status, motorcycles, and buses. These fees can be paid in the same variety of ways as Cordon fees.

VMT or *RUC* typically are charged based on miles traveled on roads covered by the municipality. There are similarly low tech and high tech ways to do this and both have their strengths and challenges. Different cities and states have experimented with on-board vehicle devices that measure miles traveled with or without specific location tracking in order to exclude or include certain roads (in region or out of region, agricultural or private roads). Tracking through cell phones, again with or without specific location traffic, is another option. Mileage reporting at intervals by registered owner or at annual or biannual inspection points is a lower tech, higher privacy, lower cost way to capture this information. The use of teleinformatics built into newer cars is another possible way to collect this information as more and more cars have this information, assuming data sharing agreements can be reached. Transponders can also be used that either track the vehicle or are read by overhead equipment on roads, though that is more likely with the prior two systems, cordon and congestion fees. Some have experimented with purchasing permits for a set amount of miles and then renewing at time or mileage intervals and settling any discrepancies. Payment stations including those at gas stations can also be used. If gas stations are used, odometer entry can be added to that equipment or vehicle information can be input to use standardized fuel economy ratings for each vehicle to assess the approximate VMT at the pump. Once again, there are many potential complexities with the VMT or RUF models. There can also be flat fees for every mile or more complex, where a certain number of miles are permitted per vehicle before the charge is assessed, for instance. Fees also may vary by Gross Vehicle Weight since heavier vehicles have a greater impact on roads.

It is important to understand the basics of these varying fees as well as the level of complexity with which they can be designed, applied, and administered. Almost any fee tends to be "regressive" when applied bluntly and almost any fee can be neutral or "progressive" when informed by specific information about the people, places, and choices for a specific region. There is a substantial body of research on these topics, and all of it must be taken to inform but not prescribe the correct answers for San Diego. Complex and comprehensive data collection, public opinion, and modeling must be done in order to assess the true nature of any tax or fee proposal. This paper aims to spotlight the wave tops in this domain so that the taxpayer may begin to understand the scope and identify what is important from their perspective in evaluating future measures.

Disaggregated spatial analysis. What does *disaggregated spatial analysis* mean? *Spatial analysis* allows space and geography to be incorporated into statistical analysis so things like distance from bus stops, work centers, grocery stores, places of worship, schools, or medical services can be factored into modeling. *Disaggregation* essentially means breaking things into groups. Taken together, *disaggregated spatial analysis* allows statisticians to look at groups based on special characteristics (e.g., income, car ownership, language spoken, age) and geographical factors (e.g., proximity to important locations, average commute, distance to public transportation) broken into very specific analyses to acutely understand the unique characteristics of San Diego County and its people and transportation needs. This analysis can be very sophisticated taking into account any number of variables.

Why do you need to know about *disaggregated spatial analysis*? *Disaggregated spatial analysis* was briefly explained here because it represents the level of complexity required for adequate

analysis to appropriately model and plan. Throughout the research, it is repeated almost universally that modeling to forecast transportation needs and subsequent planning must be based on the specific areas and people. Borrowing from other cities who experienced success may be a starting point, but it is not the complete recipe for a different jurisdiction's success. The statistics and math involved in these assessments is extraordinarily complex. A cursory review of *disaggregated spatial analysis* is only intended to demonstrate what goes into this analysis and planning - for most of us in concepts and thinking about actual people, but for the professional mathematicians and engineers at organizations like SANDAG, in equations longer than Wilt Chamberlain's wingspan.

Distributive (or distributional) effects are ways a policy, tax, law, etc. impact different people, sometimes in less obvious ways. This topic has been gaining attention in recent years as more people have come to focus on who gains (what), who loses (what), and who has neutral impact from policy, laws, taxes, fees, etc. and the recognition that we are highly interconnected and there are many unintended consequences to our actions. In the age of transparency, many policy proposals are evaluated in part based on their distributional effects so that voters and stakeholders can more comprehensively understand the full impact of proposals. A transportation example is when a road is closed to cars and made into a pedestrian road, areas around that pedestrian road see an increase in traffic, parking challenges, congestion, waiting cars, etc; businesses may see a reduction in certain business that cannot readily access them whereas other businesses may see an increase in foot traffic; physically disabled people may have a harder time accessing the area; fewer accidents (pedestrian-vehicle and vehicle-vehicle may occur); air quality may improve; etc. *Distributive effects* may be positive, negative, or neutral and must be evaluated by specific demographics or regions. In the context of transportation, they tend to arise from three sources: transport benefits (accessibility, mobility, choice, time, safety); transport costs (who pays and how the costs measure up against the benefits); and *externalities* (air and noise pollution, vibration, loss of visual appeal, loss of open space, related property value changes, quality of life issues) (ATAP, 2016).

Overview of progressivity and regressivity of funding mechanisms

This will not focus on an evaluation of the fairness or appropriateness of taxes or fees, but rather on common revenue sources to fund transportation improvements, maintenance, and operations and how they may be progressive, neutral or regressive.

As highlighted above, each of these taxes or fees has the potential to be progressive or regressive depending on the specific manner in which it is applied. Generally, the more blunt or simple the application, the more regressive they are likely to be. This is why the above primer on a few technical terms was necessary. That said, the more complicated the system, often the more time, money, and monitoring it takes to successfully implement and maintain.

Trust and transparency are critical in numerous ways. The more complex applications also often employ more technology and sometimes, more willingness to have detailed personal information collected and tracked by some entity - the government, or more likely, one or more private intermediaries. People have varying levels of comfort with this and must trust the holder of the information in many ways, including in their ability to store it securely or in anonymized ways.

It is essential that the public is engaged throughout the planning process and is able to view all relevant data and material as to how the modeling was created, what goes into it, what comes out of it, who is creating and evaluating it, how decisions are made, etc. Public engagement and education are critical to the success of all methods discussed both in their perceptions and acceptance or approval as well as to best inform the planning and implementation.

It is also imperative that there is a clear and transparent system to ensure that funds collected are allocated back to the intended and communicated use and users, which may at times be difficult to determine and communicate, and which may lead to further discussions of equity issues.

A final element that relates to trust and transparency, as well as ongoing efficiency and acceptance, is a clearly expressed plan for ongoing evaluation and changes in fees. Some jurisdictions, like Singapore, have had great success with public acceptance and making the policy apolitical with a rules-based pricing approach. It limits the frequent recurrence of political discussion around changes if the approach was communicated and agreed upon at the outset and provides reassurance that the system is dynamically linked to the goal of reducing congestion and maintaining roads. (ITF, 2018) This can be seen in examples. For instance, if it is agreed that X number of instance of congestion of a certain magnitude (not accounted for by traffic accidents, construction, or unmanageable events like weather) will trigger an evaluation and potential reset of pricing schedule, then it is expected, transparent, and consistent and not likely to get caught in political quagmires each time. Alternatively, there can be a frequency check such that every 3 months data is collected to inform the need for changes. Another option is to base reassessment of fee structure on achieved revenues compared to target revenues.

From a human nature perspective with respect to public acceptance, another element that most plans have in common is that choice is an imperative. The level of choice may vary, but a system that allows people to retain some agency in some or all circumstances as to how they travel and expend funds, is critical. If people can adjust their time schedules, chain trips, use alternate routes, or use effective alternate modes of transportation, they are much more likely to tolerate and accept the fees and they have a role in choosing how it impacts them - both positively and negatively in terms of cost, time, frustration, safety, environment, etc. It is critical that this is a true and realistic choice. For instance, if I can drive somewhere paying all the fees to minimize time in 30 minutes and my alternative on public transportation takes three hours or does not operate at the time of day I require, it is not a realistic alternative. If, however, I can pay 30% of the most efficient mode and arrive in 50 minutes at the time I need to, that is a reasonable alternative.

A feature in any of these plans to be evaluated is how to handle commercial vehicles, public transportation, or other heavy vehicles. Heavy vehicles cause more wear and tear on roads. Public transit vehicles contribute to increased wear and tear, however, if being used efficiently, are transporting many more people so the per person wear and tear is typically less than vehicle traffic. Commercial vehicles are providing services or moving goods which tend to benefit the public. One argument is that a surcharge on such vehicles is not business or industry friendly. Another argument is that those supply chains can and will incorporate any additional costs of doing business into their pricing and thereby pass the costs on to the consumers who benefit from them. This is generally how this becomes neutral or progressive.

Cordon Fees

Cordon fees generally refer to a toll applied to access a certain area - either all the time or at peak times.

Cordon fees can be applied objectively. They are also generally accepted as effective at managing congestion and demand, but require costly research and investment to apply in a neutral or "progressive" manner (ITF, 2018).

When applied simply, cordon fees can adversely impact specific households in pockets of urban areas. (ITF, 2018). Low income households, minorities, the elderly, the disabled or medically fragile are all groups that can feel a disproportionate burden of fixed cordon fees. A fee that is manageable to some households may mean skipping medical appointments or losing their job or childcare to other taxpayers.

When applied in more sophisticated ways they may minimize *regressive distributive effects* (refer to previous section for terminology review) or be progressive. In order to understand and mitigate this in pricing design and implementation, *disaggregated spatial analysis* can help reduce the number of vulnerable households affected and point towards which investments in public transportation can provide the most effective alternative transportation options (ITF, 2018). The *distributive effects* will depend on specifics of the region and people. Where do people live, work, play, receive services, and meet their needs? Where do different groups of people (ethnicities, race, socioeconomic, etc) live and what options are available to them?

If there is differentiation in pricing by time of day, most of the distributive effects can be minimized by allowing people to choose to shift the time of their travel (ITF, 2018). That said, lower income individuals also often have less control over their schedules and less ability to shift their schedules to take advantage of lower or no fee time periods to get to work, childcare pickups, etc. One research study of the Stockholm cordon toll showed that peak and off-peak pricing with one of three redistribution methods (a lump sum rebate, funds being directed to improve public transit, or targeted tax relief) were all progressive. In this study, if there was no benefit back, it was neutral (Eliasson, 2006). This is specific to the idiosyncrasies of that area, with the people involved, at that time period. Extreme caution must be taken in generalizing.

Some systems have special pricing based on qualifications (e.g., age, disability, qualification for social assistance) which can mitigate this but are also opportunities for fraud and abuse and they lower the effectiveness of congestion reduction efforts (ITF, 2018).

With respect to taxpayer acceptance of cordon fees, choice is the most valued feature in tolling. The vast majority of drivers accept tolls when they have a choice about how to avoid them or mitigate them by changing their schedule, changing their route, or being given another suitable alternative to access. When given a choice, high income people access tolled areas more and, therefore, incur more of the cost. That said, motorists across income levels value the choice of reliable trip time made possible by peak period pricing when they need it. (Morallos, 2006)

Critical in the planning of successful and equitable cordon fees is statistically evaluating the location of cordons; the price; the price variability; any exceptions, adjustments, or exemptions; the costs and timeframe to set it up; the costs to maintain it; the frequency with which it will be re-evaluated and adjusted to manage congestion, raise funds, and continue to be neutral or progressive; the collection system; the data management system and privacy concerns; the cost to administer it; the alternatives to transport without paying the cordon fee; to name a few.

To demonstrate some *distributive effects*, the London congestion fee improved air quality and, as such, was steeply progressive (Atkinson et al, 2009; Tonne et al., 2008) and reduced congestion (Santos & Bhakar, 2006; Santos, 2004) even more than tolls paid for low income motorists. It was found to be progressively distributed (Beevers & Carslaw, 2005) though the monetary value of how progressive or regressive depended on levels of suburbanization among low income households (Santos, 2004). In Copenhagen, the cordon fee helped reduce traffic fatalities by reducing vehicle trips and redirecting to safer routes; reduced noise; and improved air quality (Rich & Nielsen, 2007; Schweitzer, 2009). Atlanta showed the benefit of lower incidence of asthma, especially among low income residents, along with suppressed traffic when traffic was redirected for the Olympics (Friedman et al., 2001).

The reader is pointed to Table 11 in Appendix 7 in the appendices to see additional specifics of the impacts of cordon fees in certain cities.

Congestion Pricing, Managed Lanes, HOT Lanes, Road Pricing

This section refers to charges on toll roads, for managed lanes, or on roads at certain times of the day which may be fixed pricing or may be variable based on peak demand.

This is very similar to Cordon fees in that it can be progressive or regressive and many of the same principles and research findings apply. Cordon fees are frequently used in concert with Congestion Pricing. Lower Income people face the greatest risk of financial harm when they are denied adequate travel choices. Lack of choice to pay a toll in exchange for reliable travel times can result in lost wages, lost jobs, late fees in daycare that could have been avoided (Morallos, 2006).

Congestion fees tend to support reduction of congestion and other distributive effects described in the section on cordon fees (e.g., air quality, time savings, improved safety, etc). Road pricing will incentivize more efficient use of the roads, which should have a similar effect to building new roads in increasing productivity and improving access to jobs. When paired with investment in public transport, road pricing will drive more transit oriented urban development and contain sprawl. This will ultimately make city living more attractive, reducing commuting time and emissions of air pollution from traffic. Differentiating charges by time and location, according to the distribution of congestion, will always reduce distributional impacts. (ITF, 2018)

Deployment of these strategies tends to have high infrastructure costs to build new roads or new lanes; install technology to track scan vehicles and transponders or license plates; set up the system to manage, measure; and maintain; add toll booth options; plan and implement; etc. Some of these costs can be regressive. For instance, if a system relies on in-vehicle transponders, taxpayers often have to purchase those transponders which is not affordable for every driver. An

estimated 10-20% of the population cannot purchase transponders due to financial outlay (Parkany, 2005). Typically, there is a per use price reduction for transponder users vs pay per use drivers. As a result, people who cannot afford transponders feel that burden twice. Efforts to mitigate this may include grants for transponders or payment plans for transponders. Alternatively, the price of transponders can be built into the tolls. It is regressive if a discount is provided to transponder users but there is a purchase price for transponders that is unaffordable for lower income people. When system requires cashless or cell phone assisted payment, tracking, or significant communication, low income households do not always have access to credit cards, banks, apps, cell phones, etc. They may not be able to set up toll accounts if they require large initial deposits. (USDOT, 2008)

A well-designed value-pricing plan can be less burdensome to low-income citizens than current systems that are based on often regressive taxes, such as car-registration fees, sales taxes, and the gas tax. As an example, older cars tend to have poorer fuel economy resulting in the driver paying more gas tax than a newer car driver (US DOT, 2008).

To reiterate, choice is an integral component for public acceptance as well as mitigating regressive effects. People need to be able to minimize their costs by shifting their schedules, carpooling, taking alternate routes, or using alternate means of transportation. Road pricing needs to be planned in conjunction with the operations of additional public transport (ITF, 2018). Experience shows that when road usage pricing is introduced with adequate education and time, it is generally accepted fairly rapidly and accepted by those affected (ITF, 2018).

Selected research summaries are shared here and the reader is reminded there is additional information in Table 11 in Appendix 7. In Portland, Oregon, 3% of single occupant vehicles during peak hours are driven by low income drivers; whereas 38% are driven by relatively high income drivers (Svadlenak & Jones, 1998). This ultimately means if the system is set up for peak and off-peak pricing, the higher users are people theoretically more able to afford the fee.

A study of HOT Lane implementation in Washington, D.C. showed that the drivers in the lowest 25% of income earners would pay 5.2% and drivers in the highest 25% of income earners would pay 50.3% of tolls in HOT lane (Safirova et al., 2003), demonstrating a progressive model.

Research on the San Diego HOT Lanes on Interstate 15 shows wide acceptance initially with increased acceptance and view of fairness at the conclusion of the study. Most people viewed it as having reduced congestion and expressed high degrees of support for extension after evaluating it with respect to fairness (71% non HOT users and 75% HOT users supported extension). Further, there was little difference in opinion by ethnicity or income. In this research, there was a high desire for single riders to be able to use the HOT lanes across ethnicity and income (80% of lowest income motorists supported this perspective). (US DOT, 2008)

The reader is directed to Table 11 in Appendix 7 for additional research on these fee approaches.

Vehicle Miles Traveled, Road Use Charges (RUC)

This approach generally charges a fee, again with varying complexity, based on miles of road traveled within the boundaries impacted by the plan.

Once again, these models, depending on the specificity and complexity with which they are applied, may be more progressive or more regressive.

The VMT-based fee systems may potentially have negative ramifications and inadequate alternatives for the elderly, disabled, or other fixed income groups. If one of the goals is to reduce VMT, as a whole, these groups would require good alternative transportation options. However, when the first and last- mile issues and other accessibility or coverage issues are taken into account, public transportation does not always adequately meet the needs of these groups. It could cause members of these groups who are sensitive to every dollar spent to skip medical appointments, for instance. Played out, this may reduce preventative or maintenance care leading to poorer health outcomes and more emergencies, both of which are greater tolls on the community (as these individuals also often receive government provided medical care) and the individual.

Rural or remote areas and their residents may pay higher fees due to proximity and travel needs so higher fees may impact lower income people at a greater rate.

If implemented with a threshold of allowable miles before the per mile fees begin, as in a study in North Carolina, (Rodriguez & Pulugurtha, 2020), families with more vehicles per person can benefit by distributing miles over multiple vehicles. This is potentially regressive.

A unique component of this model is the interoperability issues. If one area, say San Diego County, is applying a VMT fee, there are complications with vehicles registered out of region, out of state, or out of Country given our proximity to Mexico. A car may be registered in Riverside County but driven primarily in San Diego. It would be difficult to capture those miles without interoperability and cooperation between Counties and States. Similarly, a car may be registered in San Diego, but most of the miles may be driven outside of the county, state, or country. There is a growing consortium of States who are collaborating and cooperating on the exploration or application of VMT fees across state lines. The consortium is referred to as RUCWest (Western Road Usage Charge Consortium) and includes 17 states, California among them. Vehicles may be registered outside the area covered but operate inside the area purposefully to avoid fees or due to natural reasons, like living in Temecula and working in San Diego. A Charlotte study found 73% of sampled vehicles registered to owners of Charlotte and 80% residents of Mecklenburg County (Rodriguez & Pulugurtha, 2020). This means 27% were not Charlotte residents and 20% were not residents of the County in which Charlotte is situated. This will naturally happen more and more near the boundary of the regulated area. Interoperability is the solution to this, however, that requires neighboring jurisdictions to use similar systems or to be willing to share information to work together to track and allocate funds.

Though it was not outlined in the above sections, privacy is a potential concern in all plans, VMT fee plans especially. In order to charge per mile, the overseeing agency must know reliably, at a minimum, how many miles are travelled. To implement a more sophisticated and progressive model, to varying degrees, the overseeing agency needs to know where those miles are travelled, and potentially when and by whom. This is because a flat VMT often produces a regressive tax. A sophisticated model that is capable of interoperability with neighboring or regional jurisdictions so the area responsible for the transportation infrastructure receives the money from miles traveled on their infrastructure by both local and non local drivers; has the ability to make

allowances for miles driven on rural, private, or already tolled roads; can collect necessary data with minimal reliance on the driver or vehicle owner input or reporting; may even account for miles driven in otherwise tolled or exempt (High Occupancy Vehicle) lanes; can collect real time data to inform transportation infrastructure development needs; can adjust per mile fee based on peak and non-peak demand or location; etc is expensive and takes a long time to fully implement. Further, those systems work optimally when relying on high tech in vehicle tracking, an element of the plan that people may take issue with for reasons of privacy and/or data security. Detailed research exists on variations of this in Western States, California and Oregon included. It covers the accuracy, various low to high tech reporting mechanisms, revenue outcomes, and people's opinions and potential acceptance of the model and the mechanisms. Information is also available about implementation, various cost structures, various collection methods, interoperability, privacy, security, etc.

Research has found that a VMT plan can be less regressive than gas tax by shifting the burden from low income households to high income households (Weatherford, 2011; Larsen et al., 2012). Some factors for this include that states with low gas taxes tend to operate more vehicles that have lower fuel efficiency and higher income households and drivers of higher fuel efficiency vehicles tend to have more annual trips, both of which make VMT more likely to be equitable than the fuel tax system (Kastrouni et al., 2015; Matteson et al., 2016). VMT-based fees based on emissions are less expensive for low-income drivers than registration fees based on emissions (Walls and Hanson, 1999). With the former, drivers do not pay out a lump-sum penalty for their polluting behavior, which allows them to adjust their behavior in response to the emissions fees and manage the cost over time (Schweitzer, 2009).

Oregon has been the West Coast leader in research and earliest adopter in implementation of a Road Usage Charge System. The Oregon Department of Transportation (ODOT) studied VMT from 2001-2007 and found that VMT could replace the gas tax for infrastructure funding (Kim et al., 2008; Whitty, 2007). In their research, over 90% of participants indicated they would pay VMT instead of gas tax (Whitty, 2007). A study in Florida (Al-Deek & Moradi, 2013) had similar results to a study in Texas (Vavrova et al., 2017), and both tested models that would create substantially more funds with a VMT plan compared to the existing gas tax.

Income based VMT models have been tested and show that they can better protect lower-income households and generate more revenue (Yang et al., 2016) than flat VMT models. Yang and colleagues (2016) further found that fixed-interval incremental fee structures for a VMT system is suitable across all income groups (i.e., neutral or not regressive) while simultaneously ensuring equity and meeting revenue goals. Income-based VMT is much more complicated and challenging than flat-rate or fixed-interval (Yang et al., 2016) in that they are complicated to determine, require proof, are subject to fraud and abuse, are open to varying perspectives on equity, and require waiving some privacy. Fraud is a consideration as many types of exemption and targeted assistance provide opportunities for malfeasance.

A factor that must be evaluated in designing such a system again goes back to the use of disaggregated spatial analysis. If households vulnerable to having mobility curtailed by road pricing are spread sparsely across cities, location-specific mitigation measures are unlikely to be an efficient way to address negative social impacts (ITF, 2018).

Planning, implementing, and maintaining these systems can take decades. ODOT reports that it could take over 20 years before a sophisticated system is fully operational (Whitty, 2007). The estimated time frame for full implementation is 20-30 years (Whitty, 2007). A potential short term solution for collecting VMT fees while the infrastructure is developed and public education campaigns ensue, is to simply have the odometer readings collected at annual or biannual inspections or smog checks by certified inspectors (Rodriguez & Pulugurtha, 2020) and/or at registration transfers.

Start up costs are also high. ODOT estimated the initial investment to be $33M for Oregon only in 2007 (Whitty, 2007). Once the start up costs have been incurred, smart infrastructure is malleable with lower additional costs. That is, it takes a lot of time and money to plan and build this system, but if computerized, for a relatively low additional cost, it can collect fees, track data and update pricing on a routine and agreed upon schedule or based on trigger points (traffic speed which is an indicator of congestion; traffic load which is an indicator of use) to perpetually meet the changing needs of a region in support of the 3 goals - reducing congestion, reducing GHG, and collecting sustainable revenue.

Once again, these opportunities to refine and fine tune the system rely on complex analysis and forecasting, as well as integration with the finance side of the house in order to ensure the multiple purposes are being achieved - reducing congestion and raising revenue to develop, operate, and maintain infrastructure to support the changing and growing needs of the community. Overall, a well-designed VMT fee structure has the potential to reduce overall VMT and congestion and improve air quality (Al-Deek & Moradi, 2013; Boos & Moruza, 2008; Zhang & Lu, 2013) which in turn reduces wear and tear on roads and travel times and improves public health outcome and public safety.

A thorough and comprehensive review on VMT implementation and considerations by the Rand Corporation can help the reader get an in-depth understanding of this model and the choice points within.

The reader is directed to Table 11 in Appendix 7 for additional research and resources. The reader is further pointed to Appendices 8, Table 12 and Appendix 9, Table 13, for additional information on Public Acceptance of Cordon, Congestion, and VMT fees as well as pros and cons on Gas Tax and Per Vehicle Fees.

V. Conclusion

It is critical for the reader to understand the context of San Diego County's transportation plan and SANDAG as a Metropolitan Planning Organization (MPO) with respect to legal mandates and priorities with respect to ongoing funding and support from the state and federal governments. The bottom line is, as a region, we are not going anywhere if we go alone. That is, local governments compromising the region have banded together to coordinate and collaborate, officially under the management of SANDAG as an MPO. Being an MPO brings advantages and disadvantages, complex challenges and complex benefits. As a result, we cannot move forward assessing an entire plan or individual components of a plan solely on the merits of what is important from our individual or our specific community perspective.

By legal mandate, SANDAG must spend a portion of allocated resources on public transportation, whether the majority of taxpayers in the region regularly utilize it or directly benefit from it. Similarly, state and federal laws require the plan to be designed to achieve certain levels of greenhouse gas emission reduction. Additional mandates relate to sustainability, land use requirements, and social equity. Regardless of how any individual or institution feels about certain components, the overarching set up for our region's transportation plan requires adherence to a host of laws. SANDAG is managing a complex set of requirements, goals, and stakeholder perspectives as well as tackling a dynamic problem that is necessarily a growing concern as our population increases, our available land decreases, and the historic way of funding infrastructure has long since become inadequate.

It is the overall finding of the San Diego Taxpayers Educational Foundation that SANDAG utilized reasonable data, methods, and assumptions to arrive at the 2021 Regional Plan. Some concerns exist related to the reliability and validity of the data from the Household Transportation Survey, largely related to the limited linguistic outreach and the reliance on smartphones to complete the survey. That said, substantial additional information was utilized by SANDAG to complete their analysis.

SDTEF does not note concerns about SANDAG's methods. SANDAG employs professional statisticians, engineers, and data scientists; consults with experts in the relevant fields; and subjects itself to professional peer reviews and appears to have a commitment to ongoing improvement as new information and new techniques are available.

SDTEF does have some concerns about SANDAG's assumptions, particularly in the context of costs and revenue streams. As noted, SDTEF is concerned that SANDAG may be underestimating the true costs to complete each of these projects, partly due to the ambitious schedule and SDTEF's assumption that delays are inevitable and will impact costs. This is nearly an unavoidable law of nature in construction and there are numerous large scale, often simultaneous projects in the plan. SDTEF also has concerns about the likelihood of many of the funding sources coming to fruition as they require legislative and/or voter approval in many cases. Additionally, SDETF is concerned that there is not an apparent prioritization plan for projects so it is not clear what would get funded first or how things would be scaled back if ample funding is not available for any reason. Further, at the level of this plan, though it likely would be when the taxpayer would be asked to cast a vote, the direct link between each project plan and each funding source is not clear.

Given the legally mandated complexity of the plan partly being related to social equity, the reader is invited to review the section in the paper that provides an overview and resources to help understand how varying taxes and fees proposed have a potential to be progressive or regressive. The paper also begins to elucidate the distributive effects of varying elements of the plan or funding strategies. The bottom line is, we are all in this together by legal mandate and organization of our government, so the reader is encouraged to understand the inter-related components of the plan. At the highest level, almost any tax or fee, when applied in a simple manner, will tend to be regressive and inadequate. Almost any fee or tax structure, when taking into account a myriad of issues and supported by research, data, and analysis, can be designed to be neutral or progressive. That said, with said research, data, and analysis, comes complexity that translates into higher implementation costs and longer implementation timelines. Along with

that, a well-designed plan should be nimble and able to adapt to an ever-changing environment and needs once it is in place due to improved technology.

This is a complex plan with complex underpinnings. It requires a long term view for sustainability, equity, and environmental stewardship. Many features require a long term analysis and a financial outlay well in advance of seeing the benefits. It is the hope of the San Diego Taxpayers Educational Foundation that this paper and its associated resources helps the reader feel more able to evaluate any future element of SANDAG's Regional Transportation Plan and associated taxes or fees in the broader context and also in each individual element.

APPENDICES

APPENDIX 1 - Taxpayer's Worksheet - Questions to Evaluate Tax or Fee Proposals

When voting on a future tax or fee proposal, it may be helpful to ask yourself (or the proposing entity):

When do I start paying for this project?
When will the project begin?
When will it end?
When will I see the positive impact? Does this project offer some or all benefit at completion or only when completed in conjunction with other elements?
Do I ever stop paying for this project? (example: Coronado Bridge is now free compared to S-125 South Bay Expressway)
Does the fee structure change over time? Does it move from a sales tax/bond to a toll?
Is it clear which projects these specific funds will be used for?
Is it clear how this specific project will impact me and communities of concern to me?
Is there risk that the intended project will not be completed even if the funding is approved? This could be because of land use approval, a contingent proposition, political changes, etc.
Does the underlying data seem well-reasoned and well-reviewed?
Do I trust the source, and the source's source?
Do the assumptions that were made make sense to me or to an expert in that field?
How have other cities/counties/regions like mine addressed this and what can we learn from them?
Does this take into account big changes or events like COVID, changes in telework, advances in technology?
I bought an electric car to manage some of these expenses. Is what they are charging me for fair?
Is this Plan going to raise my electric rates, too, so many economic benefits of my electric/hybrid car are no longer benefits?
Am I being penalized for living outside of central San Diego?
Who benefits from this plan or project?
Do I agree with the assessment of who pays for a project and who benefits from the project?

APPENDIX 2 - Questions asked on 8/18/21 by SDTEF but not answered about HTS and RTP

SANDAG 2021 RTP- Questions Regarding The Regional Transportation Study

1. The costs of purchasing or continuing to own a private vehicle have an impact on people's decision to own a vehicle or switch to transit. Is this being considered as an input of the ABM2+?

Regional Transportation Study:

2. Is there a difference between the SANDAG Regional Transportation Study and the Household Travel Survey? If yes, are both being used as data sources for the 2021 RTP? How essential has each been to the 2021 RTP?
3. According to SANDAG, 6,139 people participated in the 2016-2017 HTS. Is this number the same for the SANDAG Regional Transportation Study?
4. How is the Household Travel Survey the most important data source, as described by SANDAG? How does it contribute to the ABM2+?
5. Is RSG or SANDAG the owner of the data from this study?
6. What percentage of participants were sharing smartphones and what percentage didn't have smartphones at all?
7. How does the rMove app function in areas with bad reception? How are areas with bad reception accounted for?
8. Is the app easy enough to use for people less acquainted with smartphones (i.e. elderly)? How is it easy or not?
9. Does SANDAG put special effort into representing people with disabilities in the Regional Transportation Study? What disabilities are considered? Does someone do the surveys for them?
10. Please clarify what rMove and rSurvey by proxy mean. Why is there no rMove by proxy for adults (i.e. adults with disabilities)?
11. How is an Amazon or a Starbucks gift card a suitable incentive for all participants in the study (i.e. those who don't have smartphones)?
12. To remove the biases in the predicted number of trips, the dummy variables for the six "Bias Parameters" were set to 0. What are these dummy variables?
13. How does each of the observed biases relate to the dummy variables that were set to 0?
14. As the trip weight adjustment factor increases, how much does the raw data for a group of participants change? What is a high/unacceptable adjustment factor?
15. For households who didn't have smartphones, under which category are their trips reported? Does the data go under the category of rSurvey by Proxy?
16. In what circumstances do adults need to complete a rSurvey by proxy?
17. If a household member uses another's smartphone for the day to use rMove, how will the owner of the smartphone report their travel data for the day? Do they take turns?

18. Regarding the travel mode categories, where do ridesharing apps (i.e. uber, lyft) fit? Are they under “Other Auto.” If yes, what else goes into that category?
19. What happens if, for example, a senior citizen doesn’t know how to navigate through the rMove app? There is no data for rMove by proxy above the age of 17. How is this senior citizen accommodated?
20. What happens if a senior citizen doesn’t have family members to help him/her participate in this study? Who would be the proxy?
21. The elderly are not part of the oversampling population. What percentage of elderly in the study used a smartphone to participate?
22. How does the oversampling of low-income households for the survey compensate for the fact that participants with no smartphones could only log one day of travel and by memory compared to smartphone users, who log seven days and don’t need to rely so much on their memory? On a surface level, it seems like non-smartphone users are disadvantaged and underrepresented in this survey. How is this issue avoided?
23. How are people without homes accounted for in this study? They are frequent transit users and require just as much, or maybe even more, travel than people with homes.
24. The recruit survey questionnaire prompts, “To provide the best Spanish language experience while completing this survey, we suggest calling our toll-free number at 1 (844) 468-2570.” Why might a Spanish (non-English) speaker need guidance to take the survey if the survey is translated? Is the translation inaccurate? Does this mean that Spanish (non-English) speakers might also experience difficulty navigating rMove and rSurvey?
25. Is there someone in charge of checking how good the Spanish translations are or how accurate Google Translate translates the surveys for speakers of other languages?
26. Is there a Google Translate function also on the rMove and rSurvey app? How do participants who don’t speak Spanish or English use rMove and rSurvey?
27. For those who do not speak English or Spanish and do not own a smartphone, do they have the option to call the Study Center to report their travel decisions?
28. At this link, SANDAG says that the Regional Transportation Survey is available in Traditional Chinese and Simplified Chinese as well as English and Spanish. However, there is no mention of Chinese in the 2016 Household Travel Behavior Survey report Volume I or II. Why is there this difference? What parts of the Regional Transportation Survey are supposed to be in Traditional and Simplified Chinese?
29. According to Data USA The second most popular non-English language in San Diego, after Spanish, is Tagalog. What’s the reasoning behind having Chinese translations but not Tagalog?
30. What percentage of people invited to participate in this program actually participated? Please respond by demographic.
31. The people who received an invitation to the study by email participated in the 2016 Regional Household Survey and agreed to be contacted about future surveys. What are the demographics of those who were invited by email?
32. Can someone be unqualified to participate in this study?
33. Is the “Privacy Policy” section of the survey also provided in other languages?
34. What was the process of choosing particular intercepts to interview bicycle riders? Were the locations carefully selected to have diversity?

35. What languages are under the category of “other” in question 23 of the Bicycle Intercept Survey? What is the breakdown of the percentage of interviewers that speak each of the languages the study was conducted in? Are interviewers assigned to specific intercepts based on the languages they speak?
36. In detail, what is the reasoning behind oversampling the groups under “Other Oversample (Active Duty Military, College Student Enrollment, and Young Nonfamily Households)?”

Road User Charge:

37. Will vehicles passing through San Diego have to pay the Road User Charge? Will the answer to this question depend on how often a vehicle passes through San Diego?

APPENDIX 3 - Questions asked by SDTEF on 7/19/21 and answered by SANDAG on 10/29/21

San Diego County Taxpayers Association Questions to SANDAG	
Comment from SDCTA (posed on 7/19/21)	Response by SANDAG (released via SANDAG Board documents 10/29/21 and sent independently to SDTEF on 11/19/21)
1. What assumptions (i.e. debts service and length of projects) are going into estimating costs in YOE dollars?	The Cost Estimation Methodology and Funding Strategies for the RTP were presented to the SANDAG Board of Directors on March 21, 2021, Item No. 8B. This report and presentation described the various funding assumptions developed for the draft 2021 Regional Plan. The entire Board meeting can be found at www.sandag.org.
2. All existing TransNet funding has been claimed by currently running projects. How is the $15 billion in TransNet funding estimated? Is the $15 billion based on the assumption that San Diego voters will approve of a new extension to the program in 2024? How much of the $15 billion relies on the assumption that there will be TransNet revenue between 2048 and 2050? This accounts for just under 10% of the funding so it would create a sizable shortfall if not approved.	How is the $15 billion in TransNet funding estimated? - See Appendix V for methodology. The $15 billion is in YOE dollars. Is the $15 billion based on the assumption that San Diego voters will approve of a new extension to the program in 2024? – Yes. How much of the $15 billion relies on the assumption that there will be TransNet revenue between 2048 and 2050? - There is an estimate of $1.5 billion for 2049 and 2050 in YOE dollars.

3. Is the Quarterly TransNet Forecast a reliable source for estimating revenue from the Transportation Development Act (TDA) even though there have been observed “small differences” in TransNet and TDA growth rate? Is TDA growing faster than TransNet, or is it the other way around?	From FY 2002 to FY 2020, on average TransNet growth has been just 0.2 percentage point higher than TDA. Therefore, SANDAG considers TransNet as a reliable source to estimate future TDA revenue in the long-term.
4. Has the growth of General Fund/Miscellaneous Local Road Funds been linear historically? Are you assuming that they will continue to be linear (why or why not)? If the 5-year average growth in these funds is 2.7, how did you derive a 3% growth during the period of the 2021 RTP implementation. Is this a weighted average or an average of averages across jurisdictions?	The 5-year average is 2.7%, however, the 10-year average is 6.6% in the initial review of these funds. With additional information related to one more year of data, it revealed that the 10-year average was 3.6%. SANDAG believed it would be best to be conservative with these funds and assume an average of 3% growth that is consistent through 2048. This growth rate is linear as it should encompass the extreme highs and lows that accompanies this particular fund source
5. How much of the value capture estimate (2.7 billion) relies on the estimated value of Central Mobility Hub Enhanced Infrastructure Financing as opposed to existing agreements and programs? Value Capture is the idea that if property values, for instance, increase because of development of transit systems, that some increase in the property value should be returned to the developer of that transit improvement (e.g., property tax surcharge so that some property owner benefit of rising property value is returned to the taxpayers at large who footed the bill for the transportation infrastructure). Excerpt in 3/12/21 SANDAG	59%

Board Meeting discussed this and the historical failure of government to do this proactively in the US. Best way is proactively, much less recovery/capture is available if done after the fact.	
6. What is the Managed Lanes Feasibility Tool mentioned in Appendix V? What model or data did SANDAG use to estimate the $22 billion from FasTrak revenue?	The Managed Lanes Feasibility Tool is an interactive dashboard model developed by SANDAG's consultant, HNTB, that can be used to forecast managed lane performance and revenues. It has been used by agencies around the country to inform implementation of Managed Lane projects, phasing, and the development of associated operational policies. When outputs from the tool are compared to data from Managed Lanes once they are built, it has been found to be very accurate. This tool was used to estimate the FasTrak revenues included in the Regional Plan. The methodology uses revealed preference data from existing operating managed lanes across the country that were specifically selected to be representative based on conditions found to be similar to facilities in the San Diego region. The model analyzes existing traffic and proposed lane configuration for the San Diego facilities that are included in the Managed Lane network to assign traffic volumes. It assumes a baseline volume must be reached before drivers will be willing to pay for the Managed Lanes. Usage of the Managed Lanes is predicted based on the overall level of demand above the baseline volume, available capacity in the Managed Lane, and remaining capacity in the general purpose lanes. It includes assumptions around high occupancy vehicle and clean air vehicle policies and discounts, traffic levels, growth rates, cost assumptions, lane capacity, toll rates and inflation.
7. How did SANDAG achieve a passenger farebox recovery rate of 35%, and what is the basis of SANDAG's assumption that the recovery rate will be linear? Is the assumption that operating costs would be linear and that farebox recovery would follow the same linear growth? With proposed free fares, how will the estimated revenue be achieved?	Farebox recovery ratio is calculated by dividing the system's total fare revenue by its total operating expenses. Fare revenue is calculated by taking the ridership numbers that are generated through the Activity Based Model and multiplying them by the average fare. Operating costs grow by a Consumer Price Index of three percent annually. Each mode of transit has its own calculator for operating cost. Fare revenue does not grow at a linear rate. Ridership on routes changes based on new routes that come online, changes to land uses, and changes in the overall network. Free fares will be calculated with

	a subsidy given back to the operators to cover operating costs. Farebox recovery ratio should not change as a result but the amount of revenue subsidy will change.
8. What will be the source of funding for reduced or free fares? Is it sales tax based?	Fare subsidies may be attached to sales tax measures but could be paid for by other sources as they become available.
9. What source of revenue is each project listed in Appendix A tied to? If a source of revenue runs low, are there alternative ways to fund the projects associated with that source of revenue?	The project costs shown in Appendix A are related to the revenues explained and tabulated in Appendix V. Other than the revenues associated with the 2025 phased projects and programs, revenues sources are estimates based on future projections, coupled with historical information. If some of those future revenues don't materialize for any reason, it is not unreasonable to anticipate other (currently unknown sources) may take their place. A good recent example is funding received from Senate Bill 1 (SB 1) that was not previously anticipated and contributed to real dollars available to the region for transportation projects. However, if any future dollars do not materialize, and are not backfilled from other sources, future plans would need to be updated. These types of updates can easily be captured incrementally, given that the Regional Plan is updated every four years.
10. What is the timeline for the development of each of the projects in Appendix A? Are delays in these timelines considered in the cost estimates?	The project development timeline for the projects listed in Appendix A varies but generally follows a 6 to 14 year window, depending on the project. These windows are inclusive of the planning/environmental/design and construction phases estimated for each project. For example, highway projects are estimated to be completed within 6 years once dollars are programmed and Rapid transit projects are assumed to have an 8 year completion window. These estimates are based on recently completed projects in the region.
11. Have there been or will there be changes in the 2021 RTP to account for the impacts of the Covid-19 pandemic? Is SANDAG assuming that the effects of the pandemic on people's lifestyles and the economy will be	SANDAG has been considering the impacts of the pandemic on transportation. This includes tracking traffic levels on major corridors in the region and conducting surveys of commuters and employers across the region to understand how the pandemic might change travel behavior in the future. As a result of this research, the 2021 Regional Plan assumes a much higher rate of

short term? How do SANDAG's assumptions about the pandemic impact the RTP?	telework. However only 39% of all occupations in the region are considered home workable. Also, the majority of employers in the region that expect to offer telework, reported that they will offer it on a part time basis to a portion of their employees after the pandemic. Therefore viable commute options will continue to be needed for the many commuters who have to travel to their job site. Also, a common misperception is that teleworkers don't drive much. Data from our own regional household travel survey as well as data from the national household travel survey demonstrates that teleworkers actually make more discretionary trips for shopping, leisure, and social purposes. This is why we are seeing traffic volumes at or above pre-pandemic levels on our major corridors despite the fact that we have more people teleworking. To reduce car traffic in the future, more viable alternatives to driving are needed. The 2021 Regional Plan proposes a variety of convenient travel options, including faster transit service and flexible fleet services, for all types of trips.
12. Are there technological assumptions as well in the RTP? Is the plan based on all current technology, or are there plans that are based on expected future technology? If some plans are dependent on future technology, how are you making sure that people will feel comfortable with using the new technology?	The 2021 Regional Plan accounts for advancements in technology and potential impacts to the transportation system. For example, the Flexible Fleets of today will evolve to be connected and autonomous. Industry projections vary but widespread deployment of shared, autonomous services is unlikely until 2035 or later. The 2021 Regional Plan lays out a strong backbone transportation network that will evolve and adapt as new technologies and demands change. As new and emerging technologies or Flexible Fleets become available, SANDAG will study, design, and test services to ensure they provide equitable, sustainable and inclusive options so all can benefit from the service.
13. Have there been changes related to the 2021 RTP already? If so, is there any feedback from users? Please provide a detailed response.	Comments received on the 2021 Regional Plan and responses to each are documented in Appendix G of the proposed final 2021 Regional Plan. This appendix also notes when comments on the draft 2021 Regional Plan resulted in changes to the proposed final 2021 Regional Plan.

14. What assumptions are made in the Transit Leap Capital Cost Estimate? Based on observed figures in the SF Bay Area, it seems that, for commuter rail alone, every mile requires $1billion. How does $55 billion for all Transit Leap capital costs break down into its modes? Answer to question 9 would probably address this if sufficiently detailed.	Estimating costs for Transit Leap considered development options for new commuter rail, light rail/Trolley, and Rapid improvements to existing transit services. Costs were developed using the Federal Transit Administration Capital Cost Database, which is intended for developing order-of-magnitude cost estimates for conceptual transit projects. The cost models are automatically adjusted to account for differences in regional cost levels between locations. The unit costs generated from the Capital Cost Database were compared with known actual project costs for the San Diego region, and they were adjusted as necessary. Capital transit projects include cost estimates for construction (both station and segment per mile), right-of-way acquisition, and other non-construction “soft” costs such as environmental review, planning, and design. The transit capital costs also include the costs of vehicles through the 30-year timeline of the 2021 Regional Plan.
15. Since $27.7 billion of the total estimated revenue will depend on the Regional Road User Charge, It seems that SANDAG is confident that the fee will be implemented in 2026. Why does SANDAG think that this fee would be popular among San Diego voters? Is the $27.7 billion based on the assumption that every kind of vehicle will be charged? If the fee is not approved by voters, is there a source of revenue that would replace it?	The proposed final 2021 Regional Plan has been updated to reflect 2030 as the start of implementation for the road usage charge to better align with the timing that the State and other regions are expecting to transition to a road usage charge. Next year, SANDAG will study usage-based fees and the effect the fees will have on meeting established goals like greenhouse gas emissions reduction and improving equity for different income levels and different populations. The first phase of the study will calculate the true cost of driving a vehicle – the cost to own and operate a vehicle, the effect on road wear and tear, the cost of increasing capacity of the transportation system to meet demand, local and global pollution caused by both fuel powered and electric vehicles, traffic accidents, traffic congestion, and the cost of delays caused by congestion to the economy and to the quality of life of travelers. The study will determine how existing revenues currently funds different parts of the transportation system and how different populations are impacted. This foundational understanding will help SANDAG design a road usage charge program that encapsulates multiple factors to make it more fair across the community than the current transportation funding sources. The study will assess the potential impacts of user fees on San Diego residents, visitors, and businesses, particularly those relying heavily on transportation. SANDAG staff will consult with its Board of Directors, stakeholders, and community members to develop implementation

	strategies for a road usage charge. This includes policies such as who will pay what and how much, the fee structure, and the distribution of revenues. SANDAG is committed to developing a carefully constructed program that will ensure that no group, such as those driving fuel-powered vehicles, low-income individuals, rural residents, or those with long commutes, are paying more than their fair share. There are multiple mechanisms, such as caps and rebates, that will be explored to ensure a fair system. The road usage charge, which is being studied by both the federal and state governments, is being considered to replace an old tax system that is no longer relevant. We know this is a challenge and we respect the concerns raised. We are committed to having authentic dialogues to work through the challenges and create a revenue system that is flexible, sustainable, equitable, and fair to all. The intensive outreach and public participation process of the study will help design a system that appeals to San Diego voters. Many of the sources of revenue in the Regional Plan are uncertain, they are estimates that are developed with the best information we have available today. Some of these sources may not come to fruition, however there will also likely be new revenue sources available for transportation projects in the next 30 years that we cannot predict today. The revenue assumptions from the road usage charge in the Regional plan are based on an assumption that the fee would apply to resident trips, airport trips (SAN & CBX), visitor trips, and cross-border trips. Trips that were not included are freight, non-freight commercial, and trips that come into or through the County. Which types of trips are subject to a road usage charge will be refined in future plans as additional work is done towards implementation.
16. The total estimated revenue is about $30 billion more than the total estimated expenditure (in YOE dollars) for the 2021 RTP. Where would the extra revenue go?	There are over 30 sources of funding included in the projected revenues for the 2021 Regional Plan. While the assumptions used to develop these revenues are determined to be reasonable based on state and federal standards, the level of projected expenditures provides flexibility to account for any changes in the timing or availability of these funds over the next 30 years.
17. What is the assumption for increase in construction costs? What is the assumption	Increases in both construction and operating costs are tied to the inflation rate for the Plan which is an escalation rate of 1.93 percent annually applied (starting

for inflation? Do the construction cost estimates take into account both an increase in construction costs and inflation in the conversion to $2020?	in 2021) from the 10-year moving average Engineering News Record (ENR) Los Angeles Construction Cost Index (CCI).
18. Who participated in the peer review of your models and assumptions?	The SANDAG Activity-Based Model 2+ (ABM2+) Technical Advisory Committee (TAC) included: Brian Gardner (Federal Highway Administration) Caroline Rodier (University of California, Davis) Joel Freedman (RSG) Sherry Ryan (San Diego State University) Wu Sun (San Diego Association of Governments) Bayarmaa Aleksandr (Southern California Association of Governments) - 2020 Hsi-Hwa Hu (Southern California Association of Governments) - 2019 Bruce Griesenbeck (Sacramento Area Council of Governments) Erik Ruehr (VRPA Technologies) Guy Rousseau (Atlanta Regional Commission) Joe Castiglione (San Francisco County Transportation Authority) Lisa Zorn (Metropolitan Transportation Commission) Maren Outwater (RSG) Nagendra Dhaker (RSG) Nesamani Kalandiyur (California Air Resources Board) Tom Rossi (Cambridge Systematics) Vladimir Livshits (Maricopa Association of Governments) The TAC panel meet in May 2019 and March 2020 regarding the ABM2+ model used in the 2021 Regional Plan. For the population and jobs forecast we conducted three external Peer Review meetings as follows: March 2017

	Attendees Lynn Reaser, PhD, CBE Chief Economist; Point Loma Nazarene University Jeff Tayman, PhD Guest Lecturer, Demography and Economics, UCSD John Weeks, PhD Distinguished Professor Emeritus of Geography Erik Bruvold President, National University System Institute for Policy Research Dowell Myers, PhD Professor, Director, Population Dynamics Research Group Joe Salvo, PhD Director, Population Division, New York City Department of City Planning Ryan Ratcliff, PhD Associate Professor of Economics Stanley K Smith, PhD Professor of Economics; Research Demographer Steve Levy Center for the Continuing Study of the California Economy Ethan Sharygin, PhD Principal Demographer, California Department of Finance John Husing, PhD Primary Analyst, Economics and Politics, Inc. Ira Hirschman, Ph.D. Principal, Economic Services – U.S. Advisory Services February 2018 Gary London- London-Moeder Advisors Frank Wen- Southern California Association of Governments Ryan Ratcliff- University of San Diego Nathan Moeder- London-Moeder Advisors Ethan Sharygin- CA DOF San Diego Forward: The 2021 Regional Plan 1E-70 April 2021 Kirby Brady - City of San Diego Jeff Tayman - UCSD Gary London - London-Moeder Advisors
19. What is the time period when State Transit Assistance funding is expected to grow at 3% per year versus 5% per year? Is SANDAG's goal to encourage use of public transportation being considered in making	STA funds are assumed to grow at a constant rate of 3% per year until 2035. The assumption then changes in 2036 to 5% annually to align with the possible increase in Diesel tax and further legislation similar to SB1. STA is determined from Diesel tax and does not rely heavily on increase in public transit.

assumptions about the growth rate of STA revenue?	
20. Does the State Highway Operations Protection Program only last for 10 years? When did it start, and, if it only lasts a decade, how will it be able support the 2021 RTP projects throughout their lifetimes?	The State Highway Operations and Protection Program (SHOPP) is an ongoing four year program funded by the state, with projects selected from the state's 10-year plan. This program was created by California Code 14526 in 1977 and is adopted every two years along with the State Transportation Improvement Program (STIP). The program is expected to continue unless there is a change to California State Law.
21. How much of the Cap-and-Trade Revenue is, separately, from the Transit and Intercity Rail Capital Program, Affordable Housing and Sustainable Communities program, and Carbon Transit Operations program? Given that the Transit and Intercity Rail Capital Program and AHSC are competitive programs, how are revenues from these programs estimated through 2050? Is there a source that shows prior success in receiving the competitive funds?	The 2020 base year amounts are as follows: TIRCP $31.28M, AHSC $19.4M, and LCTOP $5.15M. For TIRCP, the region received approximately $31.278M/year on average from 2015-2020. This estimate assumes a 2% increase every year and a 10% increase every ten years starting in 2030. For AHSC, the region received approximately $19M/year on average for the first three competitive cycles and assumes a 10% increase every ten years starting in 2030. LCTOP received is approximately $5M/year since the first 2015 cycle estimated to increase 5% per year and is continuously appropriated from auction proceeds of Green House Gas Reduction (GGRF) funding and distributed based on the STA formula.
22. What percentage of total revenues are assumed to come from competitive funding sources?	Competitive Fund sources are assumed to make up approximately 13% of the total plan revenue. Recent transportation legislation has seen a shift towards more competitive programs, so that amount could increase in the future, however SANDAG continues to compete well for funding both at a state and federal level due to our international border and major port status.
23. Why are Motorist Aid Services mentioned twice as a source of revenue (once as state and once as local revenue)? Are they referring to different sources of revenue?	One program is state funded from the Freeway Service Patrol and SB1 funds and the Local program is funded from a $1 annual fee on vehicle registrations.

24. SANDAG assumes that the State FASTLANE will receive 20% of the state share of TCEP. In 2020, the revenue reflected 19% of the shares. How much does 1% represent in funding money? Also, what is the basis for the different growth rate estimates?	State FASTLANE assumes a 20% share of the state's 40% share of SB1 TCEP target which is $300M/year. 40% of the $300M/year is $120M and 20% of that is $24M/year in 2018. In 2019, $24.5M is assumed and 2020 assumes $25M/year after applying the 2%/year estimated growth rate. 1% of the $25M estimate for 2020 represents $250K. State FASTLANE growth estimates assume a combination of new revenues from SB1, state and federal funds, as well as the state's historic commitment to fund border projects, which is the reason for the different growth rate assumptions.
25. How much of the $2.8 billion in revenue estimate from State Managed Federal Programs come from each of the programs? What is the basis for the assumption that there would be additional revenue from Federal Highway Administration discretionary funds, and how much of the $2.8 billion depends on it? What is the basis for each of the estimated growth rates?	The programs included are the Highway Bridge Program and the Highway Safety Improvement Program. The State is assumed to use its portion of federal funds to supplement the funding for these discretionary programs. The funding is projected to be 74% for Bridge and 26% for Safety programs. As these programs are funded from federal formula funds, the growth rates were assumed to be the same as CMAQ/RSTP and other federal highway formula funds.
26. What is the short-term growth rate of the Solutions for Congested Corridors program that funds the Road Maintenance and Rehabilitation Account?	There is no short-term growth rate for this fund source because it is an off-the-top, set amount per SB1 legislation.
27. How much of the revenue from the Federal Transit Administration Formula programs go to Sections 5307, 5337, 5339, and 5310 each? What is the basis for the change in the growth rate of this revenue from 2% per year to 10% per six years?	As part of the FTA revenues, the calculation includes 5307, 5337 and 5339 only. The average split is 65% of 5307, 30% of 5337 and 5% of 5339. Based on past history of previous federal legislation the average annual increase of funding is 2% per year. The revenue assumptions include a 10% increase to account for new federal legislation which historically increases revenues substantially.

28. What is the basis for the assumption that the growth rate of CMAQ and regional STP revenue will change from 5% annually to 10% per six years in 2030?	As new federal acts are approved, we assume a 10 % increase in funding to maintain buying power.
29. What is the growth rate of the Federal Highway Administration Discretionary revenue before 2030? What is the basis? What is the basis of the growth rate estimation beyond 2030? What years are the estimates based on?	The estimates are based on the averages of actual grants received over the period of the grant programs (2011 - 2020). Due to the elimination of federal earmarks, there is an assumption the funding will double due to growth in the discretionary program funding. The growth rate assumes 5% in 2020 and remains flat until 2030. Starting in 2030, we assume a 10% increase every 6 years with the approval of new federal transportation legislation.
30. How was the $294 million in Grant Anticipation calculated?	The Grant Anticipation Notes are calculated from Mid-coast financial model that reflects actual issuance of GANs that occurred in 2018.
31. Are Ridehailing Company Service Fees anticipated to be on the 2024 ballot? Do ride hailing companies, separately, have to pay for the Road User Charge? What is the basis of the assumption that Ridehailing Company Service Fees would be popular among voters?	SANDAG will launch a study in the next year to further study the potential of usage-based fees and their capabilities in addressing various goals, including equity and greenhouse gas emissions reduction. This study will also assess the potential impacts on businesses, particularly those relying heavily on transportation to do business. SANDAG staff will work with Board Members, stakeholders, and community members to develop implementation strategies for a road usage charge, including high level constructs of the program, such as who will pay, the fee structure, and the San Diego Forward: The 2021 Regional Plan 1E-71 distribution of revenues. Whether Uber, Lyft, and food delivery drivers would be subject to a road usage charge, and if so, how it may impact the drivers and users of those services will be analyzed as part of this effort.
32. Have other states been successful so far in transitioning to a Road User Charge?	A variety of states, in addition to California, are in various phases of piloting and deploying a transition to a Road Usage Charge, including Utah, Texas, and a Kansas/Minnesota joint effort. The state of Oregon is the furthest along, with their program called OReGO. Volunteer participants pay 1.8 cents for each mile they drive, and that money goes directly into the State Highway Fund. Starting in 2019, the Legislature authorized ODOT to allow unlimited OReGO

	participants. Drivers of fuel-powered vehicles can receive a credit for fuel tax and remote emissions testing, and drivers of electric vehicles are eligible for reduced registration fees.
33. How is the growth rate of Regional Road User Charge revenue 2.7% until 2050 when the assumption is that more people will use transit, as opposed to personal vehicles, with the success of the 2021 RTP?	The road usage charge revenue assumptions were updated between the draft and final plan. The vehicle miles travelled (VMT) assumptions for the region show a decrease annually between 2040 and 2050. The per mile fee in 2020$ for the Regional Road Usage Charge also decreases between 2030 (first year of implementation) of .033 cents per mile to .028 cents per mile in 2050.
34. Which projects would be eliminated if Federal and State discretionary grants were not received?	The plan relies on a host of revenues from federal, state, and local sources. Without all three of these sources comingled together, SANDAG would lose the ability to build a multitude of projects and would dampen the ability to maximize local dollars to garner additional funds. Additionally, given that the Plan includes a 30-year planning period, it is possible that some sources could be swapped for others as state and federal priorities change.
35. What is the impact of reduced VMT on revenues from fuel taxes and tolls. Is this accounted for?	SANDAG's 2021 RP assumes the road usage charge will replace the gas tax revenue lost by the move to fuel efficient and zero emission vehicles. For example, if a regional agency estimated receiving $1 million in 2020 from the gas tax, then in 2030, they could have estimated receiving $500,000 from the gas tax, and $500,000 from a road usage charge.
36. How do the Federal Transit Administration and CMAQ estimated growth rates reflect revenue from recent years?	Federal Transit Administration (FTA) revenues increase by 2% on an annual basis which is consistent with historical increases. The Regional Plan assumes a new Federal Transportation Legislation Bill every 6 years which reflect past practices. With new legislation, it is assumed that revenues will have a one-time increase of 10% which has historically been the case. Actual apportionment for federal highway formula funds during the years of the FAST Act would have averaged a 5% increase per year, consistent with the plan estimated growth rates, except for a decrease in CMAQ funds as a result of reaching the end of the maintenance period for carbon monoxide attainment in 2018. That resulted in a decrease to our CMAQ apportionment in FFY 18/19, bringing the average

	to 4%. SANDAG does not foresee another decrease to CMAQ during the period of this plan so expects to see a continuation of the 5% increase per year.
37. What is the impact of reduced VMT on revenues from fuel taxes and tolls. Is this accounted for?	SANDAG's 2021 RP assumes the road usage charge will replace the gas tax revenue lost by the move to fuel efficient and zero emission vehicles. For example, if a regional agency estimated receiving $1 million in 2020 from the gas tax, then in 2030, they could have estimated receiving $500,000 from the gas tax, and $500,000 from a road usage charge.
38. Current Transportation Development Act (TDA) funds are currently used to support existing transportation services and state of good repair capital projects. Are the $7.6 billion TDA revenues in Appendix V existing TDA revenues or new sources of TDA revenues?	The TDA established two funding sources: 1) Local Transportation Fund (LTF) and 2) State Transit Assistance (STA). The $7.6B in TDA revenues shown in Appendix V is based on these two existing fund sources.
39. Where can we find the "2021 Regional Plan Transit Operations Costing" Excel workbook mentioned in Appendix U?	Costing files are located in our SD Forward Data page at: https://sdforwarddata-sandag.hub.arcgis.com/.
San Diego County Taxpayers Association	
The San Diego Taxpayer Association submitted 6 tables with their comment letter requesting various revenue and cost estimate data and analysis. To view these tables, please see the full letter attached to this appendix.	The requested data would require additional transportation model runs and analysis that are beyond the scope of the Regional Plan.

APPENDIX 4 - Table 1. Projects and Programs

Appendix A of the 2021 Regional Plan, SANDAG has a list of projects and programs where revenue for the plan will be used. The projects and programs belong to 8 categories: "Major Corridor" improvements, Rural Corridors improvements, improvements on arterials, Mobility Hub and Flexible Fleet, Next Operating System elements, Systemwide Transit Support Services, Supporting Policies and Programs, and Unconstrained Goods Movement Projects. The details for each category of projects or programs are listed in the table below.

Project/Program Category	Where/for what is Money is spent	What it entails
Transportation Improvements for Major Corridors	Identified Major Corridors are: South Bay to Sorrento, Central Mobility Hub, State Route 125 (SR 125), Interstate 15 (I-15), Interstate 5 (I-5) North Coast Corridor, State Route 94 (SR 94), Interstate 8 (I-8), Coast, Canyons and Trails, State Route 56 (SR 56), San Vicente, North County	• Improving streets and roadways for safer and more comfortable active transportation (walking, biking, using micro mobility options), likely by "retrofitting existing streets and roadways." • Creating Smart Intersection Systems; requiring freeway, urban arterial, and rural arterial management system elements. • Creating Managed Lanes, which serve to give "priority access to people using transit, carpooling, or vanpooling along with emergency vehicles and low-emission vehicles with appropriate decals" for all urban and interregional highway corridors in San Diego. For some areas, existing lanes and shoulders will be repurposed to create managed lanes. • Creating connectors for Managed Lanes and Direct Access Ramps (what buses,

		carpools, vanpools, and motorcycles along with emergency vehicles and low-emission vehicles with appropriate decals will use), which connect intersecting freeways or highways. ● Improvements at freight gateways, on rail lines, and on roadways for moving goods ● Transit Leap: high speed trains (options are new commuter rail and light rail/Trolly, and improvements to Rapid)
Transportation Improvements for Rural Corridors	Roadways that provide access to rural towns and lands	Shoulder widening, curve straightening, and technology features, such as active transportation and demand management and smart Intersections
Improvements on arterials	Arterials	Local improvements and maintenance
Mobility Hub and Flexible Fleet investments	Mobility Hub and Flexible Fleet	Mobility Hub amenities, land acquisition, and street improvements for the Mobility Hubs; operations for Flexible Fleets services (micromobility, ridehail/carshare, rideshare microtransit, and last mile delivery, etc.)
Next Operating System Elements	N/A	Required elements are listed in Table A.15 of Appendix A of SANDAG's 2021 Draft RTP.
Systemwide Transit Support Services	Supporting the infrastructure plans	● Transit Operations Costs ● Transit Frequency Enhancements ● Commuter Rail Maintenance Facilities ● Transit Fare Subsidies

Supporting Policies and Programs	To support programs that invest in capital and operational costs of the transportation system, promoting sustainable growth and development, and implementing innovative demand strategies	Investments in: ● Land use ● Housing ● Climate action planning ● Climate adaptation and resilience ● Electric vehicles ● Parking and curb management ● Transportation demand management ● Vision Zero
Other System-wide Costs	Local Streets and Roads Program, Local Bike Program, and Debt Service	N/A
Unconstrained Goods Movement Projects	Projects regarding Goods Movement that remain to be funded	Around 60 projects, most of which don't have an estimated cost identified.

SAN DIEGO TAXPAYERS EDUCATIONAL FOUNDATION

APPENDIX 5 - Table 2. Chart of Relative Surety of Revenue Streams for RTP separated by Governing Body as estimated by SDTEF

	Local Revenue Sources	State Revenue Sources	Federal Revenue Sources
Likely (In place; already approved and forecasted out; already received)	• TransNet half cent sales tax through 2048 $11.1B* • Developer Impact Fees $575M • Transportation Development Act quarter-cent sales tax $4.7B • Local Street and Road Gas Tax $1.5B • Local Street and Road General Funds & other revenue ($7.4B)* • Value Capture/Joint Use Agreement $1.4B • Existing FasTrak Revenue and toll ($20.5B)* • Forecast Passenger Fares ($12.8B)* • Motorist Aid Call Box $160M	• State Transportation Improvement Program ($926M)* • State Transit Assistance Program ($1.4B)* • State Highway Operations & Preservation Program (SHOPP) ($11.6B)* • Cap-and-Trade $1.6B • State FASTLANE $870M • State Managed Federal Programs ($1.6B)* • Freeway Service Patrol $96M • Road Maintenance and Rehabilitation Account ($11.6B*)	• FTA Formula (Sections 5307, 5309, 5310, 5316, 5317) ($3.7B)* • Congestion Mitigation and Air Quality Improvement ($5.5B)* • Federal Rail Administration $174M • Corridors & Borders Infrastructure ($2.4B)* • TIFIA Loan proceeds $537M
Possible but Uncertain (based on past performance and/or stability over time or likely proposals)	• TransNet post 2048 $21.6B* • Local Street and Road General Funds & other revenue ($31.9B)* • New Passenger Fares $6.1B*	• State Road Use Charges/VMT ($5B)* • Housing revenue for Transportation Infrastructure $3.6B • State Transportation Improvement Program ($926M)* • State Transit Assistance Program ($1.4B)* • State Highway Operations & Preservation Program (SHOPP) ($11.6B)* • State Managed Federal Programs ($1.6B)* • Road Maintenance and Rehabilitation Account ($11.6B*)	• FTA Discretionary (Sect. 5309) $18.1B • FTA Formula (Sections 5307, 5309, 5310, 5316, 5317) ($3.7B)* • Congestion Mitigation and Air Quality Improvement/Surface Transportation Programs ($5.5B)* • FHA Discretionary ($394M)* • Other Federal Revenues/Grants ($7.3B)* • Corridors & Borders Infrastructure ($2.4B)*

At Significant Risk (susceptible to vote, political changes, shifting priorities)	• Proposed FasTrak Revenue and toll ($20.5B)* • Regional Road Use Charge/VMT $14.2B • Ridesharing fee $1.3B	• State Road Use Charges/VMT ($5B)*	• FTA Discretionary (Sect. 5309) $18.1B • FHA Discretionary ($394M)* • Other Federal Revenues/Grants ($7.3B)* • Other Freight and Goods Movement $710M

*When an item is in multiple categories of surety and the amount is not readily discernible between the two, the figure is placed in (parentheses)

APPENDIX 6 - Charts submitted to SANDAG on 7/19/21 but not completed due to constraints on resources

Financial Projections

SANDAG's proposed local, state, and federal revenue/funding sources for the 2021 RTP are listed in Table 3,5, and 7 respectively. Table 9 describes assumed future revenue/funding sources.

These tables were provided to SANDAG for completion, however, SANDAG indicated completing them was outside the scope of the plan and would require additional transportation modeling. They are included here to help demonstrate the analysis that would facilitate a comprehensive, informed evaluation.

To determine the validity of the plan, it is important to consider why SANDAG is confident that it will receive these revenues and their estimated amounts, how much one can rely on these estimates, and how much of the plan relies on these estimates. Columns 5, 6, and 8 show the basis of SANDAG's confidence in receiving the specified revenue from each source. Columns 2, 3, 4, 7, and 9 show how much one can rely on a revenue source if received. Columns 10, 11, and 12 show how much the plan relies on each of the revenue sources. If the plan is significantly reliant on a source of revenue, there should be promising evidence that SANDAG is likely to receive the revenue and that SANDAG can continue to rely on these revenue sources to fund itself through 2050.

If the last column for tables 4, 6, and 8 is a "Yes," the second and third columns have to also say "Yes," for a revenue source to be valid.

In the following tables:

- Green blocks represent data
- Blue blocks represent assumptions
- Yellow blocks represent methods
- Red blocks represent sensitivity

Analysis of the assumptions in the funding and revenue estimates:

Table 3. Local Revenue Estimates

Source of Revenue: Local	Growth Rate (Short Term and Long Term)	Support for and assumptions behind Growth Rate Estimate	Is there an assumption that there will be changes in the growth rate through 2050? If so, why is the growth rate increasing/ decreasing? If not, why not?	Model(s) and Data that Support Revenue Estimate	What year(s) is the Data from and Why?	Reliability - Should this be the standard for the SD region?	If this source of revenue is competitive, what is the basis of the assumption that SANDAG will secure the estimated revenue?	On a scale of conservative to ambitious, where does this revenue estimate stand?	Sensitivity - If you change rate by ±0.1%, what change happens through 2025	Sensitivity - If you change rate by ±0.1%, what change happens between 2025-2035?	Sensitivity - If you change rate by ±0.1%, what change happens between 2035-2050?
The TransNet Program											
The Transportation Development Act											
Developer Impact Fees											
City/County Local Gas Taxes											
General Fund/Miscellaneous Local Road Funds											
Toll Road (State Route 125) Funding											
Value Capture/Joint Use Agreement											
FasTrak Revenues											
Passenger Fares											

Motorist Aid Services – Call Box Program											

Table 4.

Source of Revenue: Local	There is significant data supporting SANDAG's assumptions regarding the revenue source.	The revenue source is reliable enough to be the standard for the San Diego region.	The RTP depends significantly on this revenue source.
The TransNet Program	Yes/No	Yes/No	Yes/No
The Transportation Development Act	Yes/No	Yes/No	Yes/No
Developer Impact Fees	Yes/No	Yes/No	Yes/No
City/County Local Gas Taxes	Yes/No	Yes/No	Yes/No
General Fund/Miscellaneous Local Road Funds	Yes/No	Yes/No	Yes/No
Toll Road (State Route 125) Funding	Yes/No	Yes/No	Yes/No
Value Capture/Joint Use Agreement	Yes/No	Yes/No	Yes/No
FasTrak Revenues	Yes/No	Yes/No	Yes/No
Passenger Fares	Yes/No	Yes/No	Yes/No
Motorist Aid Services – Call Box Program	Yes/No	Yes/No	Yes/No

Table 5. State Revenue Estimates

Source of Revenue: State	Growth Rate (Short Term and Long Term)	Support for and assumptions behind Growth Rate Estimate	Is there an assumption that there will be changes in the growth rate through 2050? If so, why is the growth rate increasing/ decreasing? If not, why not?	Model(s) and Data that Support Revenue Estimate	What year(s) is the Data from and Why?	Reliability - Should this be the standard for the SD region?	If this source of revenue is competitive, what is the basis of the assumption that SANDAG will secure the estimated revenue?	On a scale of conservative to ambitious, where does this revenue estimate stand?	Sensitivity - If you change rate by ±0.1%, what change happens through 2025	Sensitivity - If you change rate by ±0.1%, what change happens between 2025-2035?	Sensitivity - If you change rate by ±0.1%, what change happens between 2035-2050?
State Transportation Improvement Program - Regional Shares											
State Transportation Improvement Program - Interregional Shares											
State Transit Assistance											

State Highway Operations Protection Program and Maintenance and Operations Program											
Cap-and-Trade											
State FASTLANE											
State Managed Federal Programs											
Motorist Aid Services - Freeway Service Patrol Program											
Road Maintenance and Rehabilitation Account											

Table 6.

Source of Revenue: State	There is significant data supporting SANDAG's assumptions regarding the revenue source.	The revenue source is reliable enough to be the standard for the San Diego region.	The RTP depends significantly on this revenue source.
State Transportation Improvement Program - Regional Shares	Yes/No	Yes/No	Yes/No
State Transportation Improvement Program - Interregional Shares	Yes/No	Yes/No	Yes/No
State Transit Assistance	Yes/No	Yes/No	Yes/No
State Highway Operations Protection Program and Maintenance and Operations Program	Yes/No	Yes/No	Yes/No
Cap-and-Trade	Yes/No	Yes/No	Yes/No
State FASTLANE	Yes/No	Yes/No	Yes/No
State Managed Federal Programs	Yes/No	Yes/No	Yes/No
Motorist Aid Services-Freeway Service Patrol Program	Yes/No	Yes/No	Yes/No
Road Maintenance and Rehabilitation Account	Yes/No	Yes/No	Yes/No

Table 7. Federal Revenue Estimates

Source of Revenue: Federal	Growth Rate (Short Term and Long Term)	Support for and assumptions behind Growth Rate Estimate	Is there an assumption that there will be changes in the growth rate through 2050? If so, why is the growth rate increasing/ decreasing? If not, why not?	Model(s) and Data that Support Revenue Estimate	What year(s) is the Data from and Why?	Reliability - Should this be the standard for the SD region?	If this source of revenue is competitive, what is the basis of the assumption that SANDAG will secure the estimated revenue?	On a scale of conservative to ambitious, where does this revenue estimate stand?	Sensitivity - If you change rate by ±0.1%, what change happens through 2025	Sensitivity - If you change rate by ±0.1%, what change happens between 2025-2035?	Sensitivity - If you change rate by ±0.1%, what change happens between 2035-2050?
Federal Transit Administration Discretionary											
Federal Transit Administration Formula Programs											
Congestion Mitigation and Air Quality Improvement /Regional Surface Transportation Programs											
Federal Highway Administrati											

on Discretionary											
Other Financing (Grant Anticipation Notes)											
Federal Railroad Administration											
Corridors and Borders Infrastructure /Other Freight Funds											
Transportation Infrastructure Finance and Innovation Act Loan Proceeds											

Table 8.

Source of Revenue: Federal	There is significant data supporting SANDAG's assumptions regarding the revenue source.	The revenue source is reliable enough to be the standard for the San Diego region.	The RTP depends significantly on this revenue source.
Federal Transit Administration Discretionary	Yes/No	Yes/No	Yes/No
Federal Transit Administration Formula Programs	Yes/No	Yes/No	Yes/No
Congestion Mitigation and Air Quality Improvement/Regional Surface Transportation Programs	Yes/No	Yes/No	Yes/No
Federal Highway Administration Discretionary	Yes/No	Yes/No	Yes/No
Other Financing (Grant Anticipation Notes)	Yes/No	Yes/No	Yes/No
Federal Railroad Administration	Yes/No	Yes/No	Yes/No
Corridors and Borders Infrastructure/Other Freight Funds	Yes/No	Yes/No	Yes/No
Transportation Infrastructure Finance and Innovation Act Loan Proceeds	Yes/No	Yes/No	Yes/No

The revenue sources in Table 9 do not currently exist. The revenue sources are:

- **Future Local Revenues:** Beginning in 2024 , assuming that there will be a one half-cent measure following the 2024 presidential election
- **Future MTS Local Revenues:** Beginning after the 2024 presidential elections, assuming that there will be a one half-cent measure following the 2024 presidential election
- **Ridehailing Company Service Fees:** Beginning in 2026, assuming there will be a fee of $1.25 for non-pooled trips and $0.65 for pooled trips ($2020)
- **Future State Revenues for Transportation** (replacing gas tax)**:** Beginning in 2026, assuming there will be a user fee of 2.3 cents (in 2026, increasing by a half cent annually) a mile with an annual Vehicle Miles Traveled (VMT) of 28 miles for cars using gasoline and 1.6 million miles for cars using diesel.
- **Regional Road User Charge:** Beginning in 2026, assuming a fee of 2 cents per mile travelled the first year (grows at 2.7% annually)
- **State Housing Revenue for Transportation Infrastructure:** Beginning in 2025 through 2030, assuming the RTP can secure $3.8 billion in 2020 dollars from California Senate Bill 795.
- **Future Federal Revenues for Transportation:** Assumes an increase to the gas tax starting in 2026.

Table 9. Estimates from New Sources of Revenue

New Revenues	Growth Rate (Short Term and Long Term)	Support for and assumptions behind Growth Rate Estimate	Is there an assumption that there will be changes in the growth rate through 2050? If so, why is the growth rate increasing? decreasing? If not, why not?	Model(s) and Data that Support Revenue Estimate	What year(s) is the Data from and Why?	Reliability - Should this be the standard for the SD region?	If this source of revenue is competitive, what is the basis of the assumption that SANDAG will secure the estimated revenue?	On a scale of conservative to ambitious, where does this revenue estimate stand?	Sensitivity - If you change rate by ±0.1%, what change happens through 2025	Sensitivity - If you change rate by ±0.1%, what change happens between 2025-2035?	Sensitivity - If you change rate by ±0.1%, what change happens between 2035-2050?
Future Local Revenues											
Future MTS Local Revenues											
Ridehailing Company Service Fees											
Future State Revenues for Transportation											
Regional Road User Charge											
State Housing Revenue for Transportation Infrastructure											
Future Federal Revenues for Transportation											

Table 10. Costs and Revenue by Project

Project	Timeline of Development (i.e. Assumed Start and Finish of Construction)	Support for the Timeline Proposed and Possible Flaws in Timeline Estimate	Operations Cost Estimate and Basis of Estimate (i.e. how is time of EIS considered)	One-Time Capital Cost and Basis of Estimate	Maintenance Cost and Basis of Estimate	Capital Replacement Cost and Basis of Estimate	Total Project Cost	Source(s) of Revenue and what percentage of the revenue it would use	Alternative Source of Revenue (in Case Revenue is Unavailable)	Project Cash Flow vs Spend Rate (i.e. pay-as-you-go or borrow)	Sensitivities - cost difference (savings or increase) for each year earlier approval	Sensitivities - cost difference (savings or increase) for each year delayed
Transportation Improvements for Major Corridors												
Transportation Improvements for Rural Corridors												
Improvements on Arterials												
Mobility Hub and Flexible Fleet Investments												
Next Operating System Elements												
Systemwide Transit Support Services												
Supporting Policies and Programs												
Other System-wide Costs												
Unconstrained Goods Movement Projects												

APPENDIX 7 - Table 11. Cordon, Congestion, and VMT Pros and Cons

Cordon Fee (fee for a specific area, may be variable) **Pros** **Cons**	**Congestion** (may be variable) **Road Pricing** . Includes **Managed/HOT lanes** **Pros** **Cons**	**Vehicle Miles Traveled (VMT) Fee** (aka **Per Mile Road Usage Charge**) **Pros** **Cons**	
May be progressive or regressive in different circumstances. On introduction, some users win and some users lose (ITF, 2018)		May be progressive or regressive in different circumstances. On introduction, some users win and some users lose (ITF, 2018)	
The size of distributive effects will depend on travel patterns by income group and the spatial location of jobs and residential zones. The blunter the pricing scheme, the more adverse impacts result because users are not priced strictly according to use. Fine differentiation of pricing by time of use allows travellers to select their preferred departure time to match their willingness to pay. This enables most users to adjust travel patterns rather than be priced off the road, minimizing distributional impacts. (ITF, 2018)		Can be applied objectively	When applied in a flat and completely objective manner, it tends to be regressive.

The overall distributional impacts of road pricing are highly dependent on the specific design of the scheme, in particular the location of cordons, when cordons are used as part of the scheme design. Whether these effects could be mitigated or compensated for through other components in the fiscal system will need careful assessment and would also depend on the detailed design of the pricing options. Assessing the social and distributional impacts of road pricing requires examination of vulnerability by location based on a mix of income, cost burden and adaptive capacity. However, as the overall distributional impact of time-differentiated pricing is likely to be low, it may be sufficient to rely on simpler approaches for assessing distance, time and location-based network-wide road pricing. (ITF, 2018)	Inter-region/state/country challenge. Wherever the boundaries are, there will be challenges related to where vehicles are registered, where they are driven, and where the revenue is directed. IF VMT is applied by small jurisdictions (i.e., cities vs Counties vs States), vehicles may be registered outside the area covered but operate inside the area (purposefully to avoid fee or due to natural reasons, e.g., living in Tijuana, working in the US; living in Alpine, working in San Diego). Requires robust tracking to optimize.
Road pricing needs to be planned in conjunction with the operations of additional public transport so as to provide viable alternatives to the tolls (ITF, 2018)	Interoperability challenges and opportunities exist depending on boundaries of the region and cooperative and interoperability functionality of adjacent regions. Requires robust tracking to optimize.

Can be applied objectively	When applied in a flat and completely objective manner, it tends to be regressive.	Can be applied objectively	When applied in a flat and completely objective manner, it tends to be regressive.	VMT less regressive than gas tax by shifting burden from low income households to high income households (Weatherford, 2011). VMT more equitable than current gas tax in TX (Larsen et al., 2012).	Tends to be regressive based on miles or gallons/miles (Walls and Hanson, 1999) (Schweitzer, 2009)

Economists generally say this is the efficient way to manage congestion (ITF, 2018) and manage demand. If objective is simply to raise revenue, this is too expensive a method. However, a smart system can support all goals - revenue, congestion, demand, and reduce GHG.	There can be households in pockets of urban areas that are seriously adversely affected. Disaggregated spatial analysis is useful to help design road pricing schemes to reduce the number of vulnerable households affected and indicate where investments in public transport can most effectively provide an alternative to car use. (ITF, 2018)	Economists generally say this is the efficient way to manage congestion (ITF, 2018) and manage demand. If objective is simply to raise revenue, this is too expensive a method. However, a smart system can support all goals - revenue, congestion, demand, and reduce GHG.	There can be households in pockets of urban areas that are seriously adversely affected. Disaggregated spatial analysis is useful to help design road pricing schemes to reduce the number of vulnerable households affected and indicate where investments in public transport can most effectively provide an alternative to car use. (ITF, 2018)	Low gas tax states operate more low FE vehicles and high FE vehicles or high income households have more annual trips so VMT more equitable than gas tax (Kastrouni et al., 2015; Matteson et al., 2016)	There can be households in pockets of urban areas that are seriously adversely affected. Disaggregated spatial analysis is useful to help design road pricing schemes to reduce the number of vulnerable households affected and indicate where investments in public transport can most effectively provide an alternative to car use. (ITF, 2018)

Most studies find overall distributional impact of road pricing schemes to be small (ITF, 2018)	Lower Income people face the greatest risk of financial harm when they are denied adequate travel choices. Lack of choice to pay a toll in exchange for reliable travel times can result in lost wages, lost jobs, late fees in daycare that could have been avoided (Morallos, 2006). There is concern that low income drivers will have to forego trips, including to their jobs or other critical locations.	Most studies find overall distributional impact of road pricing schemes to be small (ITF, 2018)	Lower Income people face the greatest risk of financial harm when they are denied adequate travel choices. Lack of choice to pay a toll in exchange for reliable travel times can result in lost wages, lost jobs, late fees in daycare that could have been avoided (Morallos, 2006). There is concern that low income drivers will have to forego trips, including to their jobs or other critical locations.	VMT-based fees based on emissions are less expensive for low-income drivers than registration fees based on emissions (Walls and Hanson, 1999). With the former, drivers do not pay out a lump-sum penalty for their polluting behavior, which allows them to adjust their behavior in response to the emissions fees. (Schweitzer, 2009)	Rural or remote areas/residents may pay higher fees due to proximity and travel needs, so higher fees may hit lower income people; Potential negative ramifications and inadequate alternatives for the elderly or disabled or other fixed income individuals.

Road pricing will incentivize more efficient use of the roads, which should have a similar effect to building new roads in increasing productivity and improving access to jobs. Coupled with investment in public transport, road pricing will drive more transit oriented urban development and contain sprawl. Better utilization of road space will ultimately make city living more attractive, reducing commuting time and emissions of air pollution from traffic. (ITF, 2018)	Fraud is a concern as many types of exemption and targeted assistance provide opportunities for fraud. If households vulnerable to having mobility curtailed by road pricing are spread sparsely across cities, location-specific mitigation measures are unlikely to be an efficient way to address negative social impacts. (ITF, 2018) Must carefully consider use of exemptions and discounts beyond emergency vehicles and public transport carefully	Road pricing will incentivize more efficient use of the roads, which should have a similar effect to building new roads in increasing productivity and improving access to jobs. Coupled with investment in public transport, road pricing will drive more transit oriented urban development and contain sprawl. Better utilization of road space will ultimately make city living more attractive, reducing commuting time and emissions of air pollution from traffic. (ITF, 2018)	Fraud is a concern as many types of exemption and targeted assistance provide opportunities for fraud. If households vulnerable to having mobility curtailed by road pricing are spread sparsely across cities, location-specific mitigation measures are unlikely to be an efficient way to address negative social impacts. (ITF, 2018) Must carefully consider use of exemptions and discounts beyond emergency vehicles and public transport carefully as they are	Oregon Dept of Transpo (ODOT) studied from 2001-07 says VMT could replace Gas tax for infrastructure (Kim et al., 2008; Whitty, 2007)	Fraud is a consideration as many types of exemption and targeted assistance provide opportunities for fraud. If households vulnerable to having mobility curtailed by road pricing are spread sparsely across cities, location-specific mitigation measures are unlikely to be an efficient way to address negative social impacts. (ITF, 2018)

	as they are susceptible to fraud and hinder effectiveness of congestion mitigation. (ITF, 2018)		susceptible to fraud and hinder effectiveness of congestion mitigation. (ITF, 2018)		

Electronic road pricing differentiated by time and place provides an opportunity to align prices for road use with the marginal costs of using roads (ITF, 2018).	Benefits of Congestion pricing may not be distributed equally (e.g., lower income people often have less control over their schedules and times or locations of travel or residence ; higher income users are more likely to pay the fee and benefit) (US DOT, 2008). Entry-level, unskilled job areas are often not well served by Public Transportation or hours are not covered adequately (US DOT, 2008). (Weinstein & Sciara, 2004) - use of toll roads/times is impacted by	Electronic road pricing differentiated by time and place provides an opportunity to align prices for road use with the marginal costs of using roads (ITF, 2018).	Benefits of Congestion pricing may not be distributed equally (e.g., lower income people often have less control over their schedules and times or locations of travel or residence ; higher income users are more likely to pay the fee and benefit) (US DOT, 2008). Entry-level, unskilled job areas are often not well served by Public Transportation or hours are not covered adequately (US DOT, 2008). (Weinstein & Sciara, 2004) - use of toll roads/times is impacted by	Short Term solution while implementing VMT infrastructure could be to charge fee with annual vehicle safety inspection based on odometer reading (Rodriguez & Pulugurtha, 2020)	Very high initial investment (ODOT estimated $33M for Oregon only in 2007 (Whitty, 2007). Depends based on mechanism for tracking (OBD or other) and set up for service stations or creation of fee collection centers and creation of system/data management/billing/reassessment

	flexibility of user time/routes		flexibility of user time/routes		
Differentiating charges by time and location, according to the distribution of congestion, will always reduce distributional impacts. (ITF, 2018)	Studies of congestion pricing show that geographic effects are significant in toll incidence. Given these findings, geographic factors also probably influence the incidence of gas taxes and emissions fees as well. Yet, multi-scale analyses that capture both neighborhood and individual effects are rare. (Schweitzer, 2009)	Differentiating charges by time and location, according to the distribution of congestion, will always reduce distributional impacts. (ITF, 2018)	Studies of congestion pricing show that geographic effects are significant in toll incidence. Given these findings, geographic factors also probably influence the incidence of gas taxes and emissions fees as well. Yet, multi-scale analyses that capture both neighborhood and individual effects are rare. (Schweitzer, 2009)	Once set up, if well-researched, system can always be updating with low marginal cost based on pre-determined factors if parallel goal is also congestion reduction and GHG reduction	ODOT - slow set up, could take over 20 years before fully operational (Whitty, 2007). Estimated timeframe for full implementation 20-30 years.

A well-designed value-pricing plan can be less burdensome to low-income citizens than current systems that are based on regressive taxes, such as car-registration fees, sales taxes, and the gas tax. Ex, older cars, poor fuel economy so pay more gas tax (US DOT, 2008)	When the system requires cashless or cell assisted payment, tracking, communication, low income households do not always have access to credit cards, banks, apps, cell phones. People may not be able to set up toll accounts if they require large initial deposits. (USDOT, 2008)	A well-designed value-pricing plan can be less burdensome to low-income citizens than current systems that are based on regressive taxes, such as car-registration fees, sales taxes, and the gas tax. Ex, older cars, poor fuel economy so pay more gas tax (US DOT, 2008)	When the system requires cashless or cell assisted payment, tracking, communication, low income households do not always have access to credit cards, banks, apps, cell phones. People may not be able to set up toll accounts if they require large initial deposits. (USDOT, 2008)	Income based VMT can better protect lower-income households and generate more revenue (Yang et al., 2016)	Income-based VMT much more complicated and challenging than flat-rate or fixed-interval (Yang et al., 2016) - complicated to determine, need proof, subject to fraud and abuse, argument of equity, privacy
Allows cost of peak usage location or time to be borne by the users rather than everyone	Inequity exists if discount is provided to transponder users but there is a purchase price for transponders that is unaffordable for lower income people. An	Allows cost of peak usage location or time to be borne by the users rather than everyone	Inequity exists if discount is provided to transponder users but there is a purchase price for transponders that is unaffordable for lower income people. An estimated 10-20%	fixed-interval incremental fee structure is suitable across all income groups while ensuring equity and revenue goals are met (Yang et al., 2016)	Need clear transparent system to ensure funds collected are allocated appropriately back to intended use and users which may difficult to determine and

	estimated 10-20% of the population cannot purchase transponders (Parkany, 2005)		of the population cannot purchase transponders (Parkany, 2005)		equity issues may come up here, as well
Congestion/Demand pricing is much more efficient than using proxies such as fuel tax alone. (ITF, 2018)	DATA ILLUSTRATION: Geographic Inequity - NY - 45% of toll revenues for Manhattan Bound people are paid by NJ drivers who only constitute 24% of Manhattan Bound Drivers. Manhattan based drivers pay 7% of toll revenue. Resident of 4 other NY boroughs pay 29%. (NYC Traffic Congestion Mitigation Committee, 2008)	Congestion/Demand pricing is much more efficient than using proxies such as fuel tax alone. (ITF, 2018)	DATA ILLUSTRATION: Geographic Inequity - NY - 45% of toll revenues for Manhattan Bound people are paid by NJ drivers who only constitute 24% of Manhattan Bound Drivers. Manhattan based drivers pay 7% of toll revenue. Resident of 4 other NY boroughs pay 29%. (NYC Traffic Congestion Mitigation Committee, 2008)	Potential to reduce overall VMT and congestion and improve air quality (Al-Deek & Moradi, 2013; Boos & moruza, 2008; Zhang & Lu, 2013)	Does not necessarily account for Gross Vehicle Weight (GVW) and differential wear and tear on roads, emissions, and operational performance

Pricing certain trips off the road, to public transportation, carpooling, or off peak helps low income communities too with respect to travel time, pollution (Schweitzer, 2009)		Pricing certain trips off the road, to public transportation, carpooling, or off peak helps low income communities too with respect to travel time, pollution (Schweitzer, 2009)		Must determine how to charge commercial vehicles. One could argue the people who benefit from the deliveries done by commercial vehicles will cover the costs bc cost increases will be put into purchase price.
Having access to affordable transponders and multiple ways to add money to account helps mitigate issues of low tech or low resource households. (USDOT, 2008)		Having access to affordable transponders and multiple ways to add money to account helps mitigate issues of low tech or low resource households. (USDOT, 2008)		Must determine how to charge mass transit vehicles. Mass transit is greener but also harder on roads, possibly environment on a vehicle to vehicle basis but the additional cost is shared among all rate payers

DATA ILLUSTRATION: Portland, OR - 3% of single occupant vehicles during peak hours are low income; 38% relatively high income (Svadlenak & Jones, 1998)		DATA ILLUSTRATION: Portland, OR - 3% of single occupant vehicles during peak hours are low income; 38% relatively high income (Svadlenak & Jones, 1998)		Multiple options for data collection - always on per vehicle transponder, on/off on board device (OBD), cellular, odometer reporting. Data can be transferred to DOT or gov agency or intermediary for privacy concerns; or fuel stations for data hub option and incremental billing option like what most drivers are used to now (Bertini et al., 2002)	privacy and government surveillance concerns depending on collection modality, data transfer, and data management/owner

DATA ILLUSTRATION: If .05$ VMT fee in LA, the lowest 20% of income earners would bear 7% of the financial burden, whereas the highest 20% income earners would bear 35% of the burden (Deakin & Harvey, 1996).		DATA ILLUSTRATION: If .05$ VMT fee in LA, the lowest 20% of income earners would bear 7% of the financial burden, whereas the highest 20% income earners would bear 35% of the burden (Deakin & Harvey, 1996).		In-vehicle device electronically computes and securely transfers data to bill owner of vehicle. Can apply ZONES based on different road types, proximity to congestion areas (Donath et al, 2006). Council on State Governments (2010) also put forth pricing zones by time of day which produced 22% decline in VMT during peak hours thereby helping congestion and greenhouse gases (GHG).	Data security could be an issue and system could be susceptible to hackers

DATA ILLUSTRATION: Rand Corporation and Volpe National Transportation Systems Center (2007) by household survey, rush hour travelers are more affluent group		DATA ILLUSTRATION: Rand Corporation and Volpe National Transportation Systems Center (2007) by household survey, rush hour travelers are more affluent group		DATA ILLUSTRATION: VMT can generate substantially more funds (Florida, Al-Deek & Moradi, 2013) (Vavrova et al., 2017, Texas)	DATA ILLUSTRATION: Charlotte study - 73% sampled vehicles registered to owners of Charlotte, 80% residents of Mecklenburg County (Rodriguez & Pulugurtha, 2020)
DATA ILLUSTRATION: DC - lowest income 25% would pay 5.2% and highest income 25% would pay 50.3% of tolls in HOT lane (Safirova et al., 2003)		DATA ILLUSTRATION: DC - lowest income 25% would pay 5.2% and highest income 25% would pay 50.3% of tolls in HOT lane (Safirova et al., 2003)			DATA ILLUSTRATION: If done with a threshold of allowable miles (NC study Rodriguez & Pulugurtha, 2020) before VMT applied, families with more vehicles than needed can benefit which is inequitable.

DATA ILLUSTRATION: Natural experiment in ATL before during and after 1996 olympics showed short term reductions in traffic from suppression reduced the incidence of asthma, particularly in poorer neighborhoods (78) Schweitzer 2009)		DATA ILLUSTRATION: DC - analysis of gains/losses in accessibility to jobs by highway (Hispanic/Latinx 5.4%, LI 4%, Disabled 1.3% lost 1%+ more than general population and African American gained 3.2% less while Asian and Hispanic/Latinx gained 3.1% and 4.1% more respectively; and by transit (No losses by group for transit, Hispanic/Latinx lost relatively more than general population by 1.6%, African American, Asian, Low Income,			

		disabled gained more) (National Capital Region Transportation Planning Board, 2008)			
DATA ILLUSTRATION: Geographic Inequity - NYC - With careful analysis, (example NYC Traffic Congestion Mitigation Committee, 2008), fees can be charged differently based on reg of vehicle for certain areas and revenues can be directed to mitigate geographic inequity quite effectively		DATA ILLUSTRATION: HOT lanes were found to provide social welfare gains to all income levels in Washington DC (Safirova, 2004). This analysis compared HOT lanes with more comprehensive tolling methods and found that HOT lanes provided almost as much congestion relief at a much lower social cost than the more comprehensive			

		tolling schemes. Each income group is expected to gain by a minor amount, as the toll payments do not allow much consumer surplus. (Schweitzer, 2009)			

DATA ILLUSTRATION: Income Inequity - NYC - can be largely mitigated by planned pricing and directing revenues to appropriate places including public transportation, and supporting walking/biking/alternatives (a subgroup of 1% of Manhattan workers who are negatively impacted are low income and low income individuals as a whole benefit considerably from infrastructure/public transit improvement. Further tax credits could be given to low income families for the amount that		DATA ILLUSTRATION: Income Inequity - NYC - can be largely mitigated by planned pricing and directing revenues to appropriate places including public transportation, and supporting walking/biking/alternatives (a subgroup of 1% of Manhattan workers who are negatively impacted are low income and low income individuals as a whole benefit considerably from infrastructure/public transit improvement. Further tax credits could be given to low income families for the amount that			

exceeds round trip transit fare) (NYC Traffic Congestion Mitigation Committee, 2008)		exceeds round trip transit fare) (NYC Traffic Congestion Mitigation Committee, 2008)			
DATA ILLUSTRATION: Stockholm City Center - congestion pricing - affluent men pay the most of total fees. If fees are used for public transportation, those who gain the most are young, low income, singles, women, and residents of inner suburbs (Transek, 2006)		DATA ILLUSTRATION: With careful analysis, (example NYC Traffic Congestion Mitigation Committee, 2008), fees can be charged differently based on reg of vehicle for certain areas and revenues can be directed to mitigate geographic inequity quite effectively			

DATA ILLUSTRATION: Stockholm cordon toll - peak and off peak with lump sum rebate, public transit allocation, or tax relief were all progressive; no benefit back was neutral. (Eliasson, 2006) (Schweitzer, 2009)		DATA ILLUSTRATION: Stockholm City Center - congestion pricing - affluent men pay the most of total fees. If fees are used for public transportation, those who gain the most are young, low income, singles, women, and residents of inner suburbs (Transek, 2006)			

DATA ILLUSTRATION: London congestion fee improved air quality (steeply progressive Atkinson et al., 2009; Tonne et al., 2008) and reduced congestion (Santos & Bhakhar, 2006; Santos, 2004) even more than tolls paid for low income motorists)and was progressively distributed (Beevers et al., 2005) though monetary progressive v regressive depended on levels of suburbanization among low income HH (Santos, 2004) (Schweitzer, 2009)		DATA ILLUSTRATION: If the toll is low enough, or if low-income people are transit users, the incidence even of involuntary tolls can be progressive, as in Stockholm. Even without revenue factored in, the Stockholm charges were progressive, and with public transit, both the out-of-pocket payments and net benefits were found to be progressive. (Schweitzer, 2009)			

DATA ILLUSTRATION: Copenhagen - reducing traffic fatalities by redirecting vehicle trips to safer routes and by eliminating vehicle trips; reducing noise, air quality benefits (Rich & Nielsen, 2007; Schweitzer, 2009). BUT sometimes, English study air quality benefit small and big congestion benefit (Santos, 2004) OR increasing gas tax can have positive benefits for safety and other external costs that have distributive consequences by income (Leigh & Geraghty, 2008; Schweitzer 2009)					

APPENDIX 8 - Table 12. Cordon, Congestion, and VMT Acceptance

Cordon Fee (fee for a specific area, may be variable) **Public Acceptance**	**Congestion** (may be variable) **Road Pricing** . Includes **Managed/HOT lanes** **Public Acceptance**	**Vehicle Miles Traveled (VMT) Fee** (aka **Per Mile Road Usage Charge**) **Public Acceptance**	**Overall Concerns**

Experience shows that when road usage pricing has been introduced, it is generally accepted fairly rapidly and accepted by those affected (ITF, 2018)	ODOT >90% of participants said they would agree to continue paying VMT as replacement to gas tax (Whitty, 2007). With good planning, transparency, and public education, likely reasonably high acceptance rate by public.	Privacy and government surveillance concerns depending on collection modality, data transfer, and data management/owner

Singapore has enjoyed general support for road pricing from the population as their rules-based pricing approach has made the policy apolitical and provided reassurance that tolls are not adjusted to increase revenues but, instead, are regularly corrected to maintain levels of service. This approach to pricing also removes the need to conduct sophisticated modelling to set or modify prices. (ITF, 2018)	Key to acceptance is thorough public education, input, research, and planning. System must demonstrate what the charge will be based on and where/how it will be utilized (Rodriguez & Pulugurtha, 2020).	Need clear transparent system to ensure funds collected are allocated appropriately back to intended use and users which may difficult to determine and equity issues may come up here, as well

32% of low income vs 45% of high income people supported paying for transportation infrastructure via taxes compared to 58% low income; 42% high income support for tolls (Taniguchi, 2008)	Privacy issues may not be as high as conveyed. 73% of Inland Empire respondents consider video enforcement of tolls reasonable (Pande, et al., 2011)	Do not agree with fees or taxes for this purpose or not managed in this way
CHOICE - most valued feature in tolling is if there is a choice (Morallos, 2006). Although high income people use it more, all value the choice of reliable trip time when needed.	96% of OReGO participants reported they were largely satisfied with their experience	Concerns regarding the design of the system and equity/inequity

	(ODOT, 2019)	
2007 Survey SF residents, support for congestion pricing was slightly higher among low and very low income residents who are more likely to use public transport and may have less scheduling flexibility (JD Franz Research Inc, 2007)	WA pilot - 83% of respondents felt they were asked to provide the right amount of information , and 5% felt they were asked to provide too much (WSTC, 2020)	Setting up complex systems can take decades

	San Diego I-15 HOT Lanes - wide acceptance, increased acceptance and view of fairness at conclusion of study; viewed it as having reduced congestion; high support for extension with respect to fairness (71% non HOT users and 75% HOT users); little difference in opinion by ethnicity or income; high desire for single riders to be able to use across ethnicity and income (80% of lowest income motorists); revenues support buses in the corridor (USDOT, 2008)	WA pilot - Driver preference for simplicity in mileage reporting increased over the course of the 12-month pilot, ending as the second-most important acceptance factor after privacy protection (WSTC, 2020)	Initial outlay to design and implement complex systems has very high costs and often many years before ROI is realized or improvements can begin to be felt

	Denver - I25/US-36 HOT - no critical concerns regarding equity or other social impacts (USDOT, 2008)	Participants in pilot programs have had a relatively high approval of the RUC (>90%) (Hanley & Kuhl, 2011)	

	I-394 Minneapolis, MN - 1st effort negative public view of High Income benefit; 2nd effort - congestion was worse; shortage of transpo funds helped, education efforts helped showing how all income groups benefit. Income <50k - 25% transponder owners, 32% non transponder owners. Individuals with higher incomes receive more benefits and pay more (79% high income, 70% middle income, 55% lower income people use HOT lane) (U of Minnesota & NuStats, 2005). Higher income users used more based on their residential location and income. (Patterson & Levinson, 2008). Equity benefits include 1) shifts vehicles out of general lanes; 2) high quality public transit alternatives were supported; 3) unused transponders are insurance for high value travel time; 4) social benefits are paid for by those who choose to drive thereby improving situational equity (Patterson & Levinson, 2008). 65% of all respondents (71% Hi, 61% middle, 64% lo) approved of HOT	Oregon's program has led to several key findings: perception of participants was positive, privacy concerns could be addressed, and payment of the RUC could be integrated with the gasoline tax without doubly charging RUC payers.	

		(Jenn, 2019)	
	I-10 & US-290 Houston - no shared equity concerns. Even lowest income group, 2/3rds of respondents wanted to pay to use the HOT lane (Burris et al., 2007)	California pilot found that participants generally had a positive perception of the program. (Jenn, 2019)	
	I-67 Seattle - Low income drivers are as supportive of HOT lanes as other income drivers (USDOT, 2008)		

	SR-91 Orange County - At any given time, about 25% of toll lane vehicles are owned by high income drivers and 75% by middle and Low income drivers. 19% of peak period users <40k and 42% <60k. Over half of commuters with household incomes <25k approve of toll lanes (USDOT 2008). Moderate income effect with percentage of trips in HOT for lowest and highest income groups (20 % and 50%) over 3 years....use of express lanes increased for carpoolers and solo drivers across income over time. Low and middle income groups were more selective (Sullivan, 2000)		
	Kings, County WA Seattle area - 78-84% survey respondents preferred electronic tolls vs sales tax increase to fund bridge replacement (EMC Research Inc, 2007). Support for tolling was higher if some revenue went to transit improvement (64% for $2.50 toll for bridge replacement and 74% support for $4 toll for same bridge replacement AND increased transit and bike development. 69% supported variable tolling.		

	58% of respondents in Inland Empire survey would like proposed toll revenues to be used for general transportation infrastructure improvements (Pande, et al., 2011)		

APPENDIX 9 - Table 13. Gas Tax and Per Vehicle Fees Pros and Cons

Gas Tax		Per vehicle Fees	
Pros	**Cons**	**Pros**	**Cons**
Easily payable by vehicle drivers/owners in small increments every time they fuel up	Revenue has gone down consistently due to increased vehicle efficiency (1974, avg Fuel Efficiency (FE) 14.2mpg, 1997 27.6mpg (Wachs, 2001). It is not adequate to meet the growing needs and shrinking revenue.	Applied objectively	Dill et al. (1999) Vehicle registration fee graduated by emissions is regressive by income. Higher income people pay lower percentage of income compared to medium and low income households (Schweitzer, 2009)
Tax is paid by the users of the vehicles rather than by everyone	Alternative fuel vehicles are not paying their share	Easy to apply	Difficult to also raise revenue and not be burdensome in each payment

Administration of gas tax is easy and inexpensive and in place	No differential based on gross vehicle weight - heavier vehicles cause more wear and tear on roads	Can be graded by income (Walls & Hanson, 1999).	Flat emissions-based registration fees are significantly regressive based in lifetime income vs annual income (Walls & Hanson, 1999).
Low fraud potential or potential for abuse	Does not generate enough revenue to construct, operate, and maintain transportation infrastructure	Can charge by vehicle weight	
No or limited privacy concerns	Lack of regard for inflation (Federal tax has been stagnant for 30 years, State can be adjusted with vote). Current gas tax rate in US approximately $.02/mile (Parry & Small, 2005). Lowest gas tax rate among industrialized countries (Parry & Small, 2005)	Can charge alternative fuel vehicles for road use not collected by gas tax	
Less fuel efficient cars cause more damage environmentally, and are often heavier causing more wear and tear on road, and they pay more in gas tax if they require more fuel	Gas Tax does not account for or address pollution, congestion, pavement deterioration, road maintenance		

Gas taxes can be somewhat less regressive than other tools, but that the total burden from the gas tax can be high depending on the design of the tax and revenue scheme. Revenue "recycling" concerns the use of tax revenues to either lower other taxes or to provide rebates on the tax in question (Metcalf, 1999). Recycling based on gas tax payments was found to be less regressive than recycling based on income. (Schweitzer, 2009)	Redesigning the gas tax to take into account full cost of car ownership (road construction, operation, maintenance, congestion, greenhouse gases) based on percentage of the cost of fuel would be $1.50-$2.50 per gallon. Some consider this rate untenable and unaffordable.		
	Often lower income people have lower fuel efficiency vehicles bearing a higher burden of gas tax in tax per gallon. US Congressional Budget Office, 1990 found motor fuel tax regressive relative to annual income. (Schweitzer & Taylor, 2008) fuel tax, sales tax, tolls are regressive burdening the poor more than the rich.		
	Low gas tax states operate more low FE vehicles and high FE vehicles or high income households have more annual trips so VMT more equitable than gas tax (Kastrouni et al., 2015; Matteson et al., 2016)		

	Potential negative ramifications and inadequate alternatives for the elderly, disabled, or others fixed income.		
	Studies of congestion pricing show that geographic effects are significant in toll incidence. Given these findings, geographic factors also probably influence the incidence of gas taxes and emissions fees as well. Yet, multi-scale analyses that capture both neighborhood and individual effects are rare. (Schweitzer, 2009)		

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