New Transportation Planning Paradigm: Constraints-Based Planning in the Era of Limited Transportation Funds

Donald R. Samdahl, Fehr & Peers,
Julie Morgan, Fehr & Peers

Abstract

Traditionally, cities and counties plan transportation facilities to provide uncongested traffic operations for decades into the future. Under the traditional planning paradigm, transportation projects are selected based on criteria like functional classification, design standards, and ability to provide acceptable operating conditions, as defined by measures such as level of service (LOS), through a determined horizon year. Once a design is developed to meet these objectives, funding is obtained and the project is constructed.

However, as funding for transportation projects becomes scarcer, this traditional planning paradigm is becoming increasingly unrealistic. Funding availability to construct a project can no longer be assumed. This has already been well established in regional transportation planning processes, but has yet to take hold at the individual city and county level. Moreover, with increasing congestion in urban areas, designing facilities that would meet target LOS thresholds in the long-term is becoming cost prohibitive.

This paper builds on a concept proposed by Breiland and Milam (2009) that promotes replacing the traditional transportation planning process with a constraints-based approach that addresses new funding and political realities. To demonstrate how transportation planning could better adapt to funding constraints, we will present case studies from California and Washington State. This approach represents a way to make transportation planning sustainable in the age of fiscal constraints.

Introduction to the New Planning Paradigm

Transportation plans are developed by striking the right balance between three primary components:

1. Land Use Growth
2. Need for New Infrastructure (often defined using LOS standards)
3. Availability of Financial Resources

Like a three-legged stool, if these components are out of balance, the transportation plan is wobbly and unlikely to be effective.

The traditional planning paradigm (**Figure 1**) focuses on the first two components. It starts with a land use plan, forecasts future traffic volumes, and identifies transportation projects based on established criteria such as level of service (LOS) standards. Once a

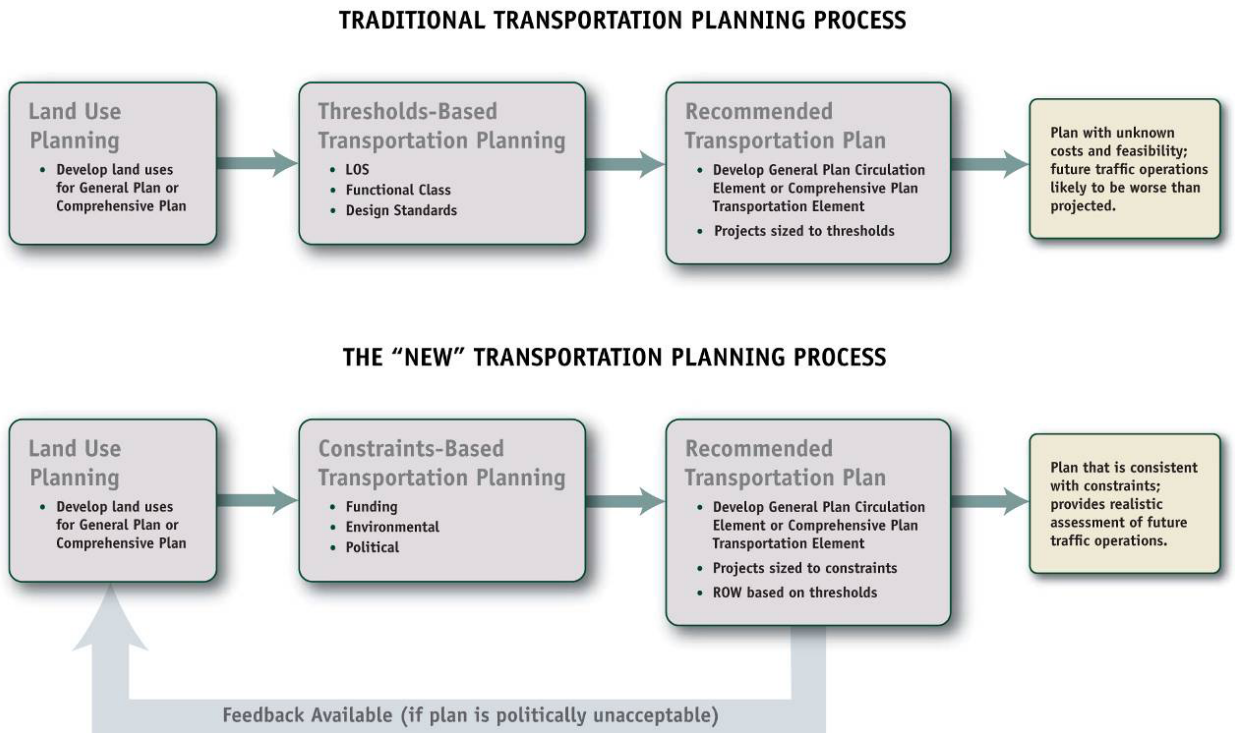
transportation ‘solution’ is developed to meet these objectives, funding is assumed to be obtained and the project is constructed. (Breiland and Milam , 2009)

However, as funding for transportation projects becomes scarcer, this traditional planning paradigm is increasingly unrealistic. Funding availability to construct the identified infrastructure projects can no longer be assumed, especially at a level needed to meet outdated LOS standards. The stool becomes very wobbly with one leg shorter than the others.

The traditional planning paradigm is also becoming outmoded due to the need to consider ‘non-traffic’ factors —including implications for other user groups, effects on the environment, and right-of-way requirements—as important considerations in planning transportation facilities.

The new planning paradigm differs from the traditional approach in a few important ways. To illustrate the differences, Figure 1 shows the “traditional” and “new” planning approaches.

Figure 1. Traditional and New Transportation Planning Processes



Challenges of the Traditional Planning Paradigm

One of the biggest challenges of the traditional planning paradigm is that it is a fairly linear process. The resulting adopted transportation plan (often called the Transportation Element) is typically unconstrained by financial or political feasibility. The plan's true costs (whether financial, political, or environmental) are often not considered until years later when implementation is well underway. Considering these constraints so late in the process makes it difficult for decision makers to revisit the plan and modify as necessary when problems are revealed. This lag effect also makes it extremely difficult for the plan to actually deliver on stated performance objectives, such as maintaining a LOS threshold. Instead, future traffic operations will be worse than reported because capacity expansions identified in the plan cannot be fully constructed due to insufficient funding or unforeseen political/environmental obstacles.

New Planning Paradigm

Conversely, the new planning paradigm is an iterative process designed to develop a financially-solvent and politically/environmentally feasible transportation plan. The process still begins with engineers and planners developing a land use plan. However, the next step involves taking a hard look at the constraints that affect that community's planning process. In acknowledging these constraints up-front, staff and decision-makers can look for the most cost-effective improvements that fit their situation.

If a jurisdiction cannot afford all of the capacity expansion projects required to meet the performance objectives established in its long-range plan, the new planning paradigm calls for the jurisdiction to consider changing one or more of the following plan elements:

- Refine the land use plan to fit within identified constraints.
- Increase revenues by identifying new funding mechanisms.
- Change the design of proposed projects to reduce costs.
- Decrease expectations about the transportation system's future operating performance (i.e., lower the LOS standard).

This approach provides decision-makers with a clear list of options, including the tradeoffs associated with changing various components of long-range plans. Therefore, the three-legged stool is level, and the transportation plan is adequately balanced.

The Effect of Funding Shortfalls on Regional Transportation Planning

The Breiland and Milam study assessed how much the changing funding picture is affecting transportation project delivery by reviewing regional transportation plans (RTPs) prepared by several metropolitan planning organizations (MPOs) around the country. Federal law requires that RTPs include only projects that fit within reasonably anticipated funding levels. As a result, it was found that many MPOs routinely truncated their project lists to match anticipated revenues. They were not, however, typically reassessing land use plans or service levels necessary to bring the plans within balance.

Considering funding shortfalls on a per-resident basis, some regions were found to have funding gaps in excess of $10,000 per resident, while others were more manageable in the range of $1,000-3,000 per resident. The magnitude of the shortfalls suggests that regionally-designated operating performance targets (e.g., LOS standards) could not be achieved unless jurisdictions took additional actions, such as raising new revenues, modifying project design to reduce costs, or amending land plans to allow for less development. Alternatively, jurisdictions could also choose to change their performance standards, though in the study few were found to have considered this option.

How to Put the New Planning Paradigm Into Action

Below, we examine case studies of two jurisdictions in California and Washington State where the new planning paradigm has been (or could be) applied.

City of Manteca, California

Manteca is located in San Joaquin County in California's Central Valley. Once a small farming town, by 2008 the city had about 65,000 residents, largely due to the influx of people who commute to jobs in the San Francisco Bay Area. In addition to the growth of residential uses, Manteca experienced rapid growth in the service and industrial sectors. The swift pace of development in the first ten years of this century was not accompanied by an equal increase in new roadway capacity, which led to increased levels of traffic congestion.

While the city experienced a boom in development in the early 2000s, it relied on a transportation funding program originally developed in 1989. For the most part, this issue was overlooked because the city (and, to a lesser degree, the state) had built a system with adequate reserve capacity to accommodate some growth. However, as the development boom began to fade, city staff realized that they were facing an increasingly large funding shortfall with a shrinking pool of new development over which to spread the cost of infrastructure to meet the city's target operating threshold, which

was LOS C on most transportation facilities, except for some facilities where land or funding constraints meant that LOS D was accepted.

Planning Paradigm Opportunity

In early 2008, the City of Manteca began updating its transportation impact fee program. Recognizing that the city's existing transportation impact fees were insufficient to fully mitigate the transportation impacts that would result from development anticipated in the 2023 General (or Comprehensive) Plan, City leaders started to rethink the traditional planning paradigm.

Manteca's Community Development Department released a Development Services Action Plan, which quantified the necessary development fee levels to maintain the City's desired roadway LOS standards. Overall, the plan found that the transportation system prescribed in the City's 2023 Comprehensive Plan was unlikely to be funded under the current regulatory framework (City of Manteca, 2008): "There is a disconnect between land use utilization patterns in the adopted [Comprehensive] Plan and the financial reality of constructing the infrastructure necessary to accommodate that utilization."

The Development Services Action Plan identified those fees per dwelling-unit equivalent (DUE) necessary to fully mitigate the transportation impacts of planned development would be about $37,000. This compared to the then-current fee of about $5,400 per DUE for transportation infrastructure (San Joaquin Partnership, 2008).

Realizing that this impact fee level was well above what was desirable or feasible to charge in Manteca, the Development Services Action Plan proposed an amendment to the City's Comprehensive Plan. In pursuing this amendment, decision-makers could choose between several options in deciding how to plan a financially-solvent transportation system without raising fees to the levels suggested in the Development Services Action Plan:

- Reduce roadway performance expectations by lowering the circulation element target threshold to LOS D or E – this would require less transportation infrastructure to be built, but would allow for higher levels of vehicle delay.
- Amend the Comprehensive Plan land use element to reduce the amount of development. Under this scenario, Manteca would remain a smaller community through 2023.
- Modify the design of planned transportation facilities to reduce costs – this would mean constructing less expensive transportation infrastructure in place of some of the projects listed in the Comprehensive Plan.

Clearly enumerating the policy options involved in considering their long-range transportation plans was a new exercise for the City, and it sparked healthy debate about how the City should prioritize the three legs of the transportation planning stool.

City of Kent, Washington

Kent is located in South King County, between Seattle and Tacoma. It has a population of about 110,000 after a large annexation occurred in 2010.
Historically, Kent has experienced strong growth in residential, retail and industrial uses. In the midst of this growth, the City undertook a Transportation Master Plan (TMP), which started in 2005 and was adopted in 2008.

The Kent TMP was developed using the traditional planning paradigm**.** Future travel growth was forecast using the city's expected land use growth patterns. This forecast resulted in a need for substantial roadway capacity increases to meet the city's adopted traffic LOS standards. In addition, the TMP identified needs for pedestrian, bicycle, and transit infrastructure. The TMP did recognize that the city would not be willing or able to widen roadways in downtown Kent or along an existing major arterial route that was already highly constrained; in response, an LOS F standard was adopted for those areas.

Planning Paradigm Opportunity

The resulting TMP resulted in an estimated $550 Million in infrastructure needs, summarized in **Table 1**. As required by the State's 1990 Growth Management Act (GMA), the TMP must include a funding program to demonstrate the city's ability to pay for the needed improvements. The GMA also includes a concurrency provision that requires "improvements or strategies are in place at the time of development, or that a financial commitment is in place to complete the improvements or strategies within six years." These financial commitments can be made through a jurisdiction's capital improvement program or by agreement between the jurisdiction and a private developer.

Table 1- Kent Transportation Master Plan Recommendations and Costs

TMP Recommendations	Cost ($Million)
Streets	**$ 528**
• Street Widening	$ 247
• Intersections	$ 65
• Railroad Grade Separations	$ 171
• New Streets	$ 45
Pedestrians and Bicycles	**20**
Transit	**5**
Total	**$ 553**

Source: Kent Transportation Master Plan, 2008

Concurrency programs provide the opportunity to ensure that the level of traffic operations envisioned in a jurisdiction's Comprehensive Plan is realized in the future. Cities and counties throughout Washington have developed concurrency programs.

With these requirements in hand, the City of Kent adopted a funding program that, on paper, could pay for the needed projects over 20 years. About half of this amount could be covered by existing funding sources, with the remainder coming from new sources. The funding needs were vetted with council members before the final TMP was brought for adoption, so the program seemed to be on solid financial ground.

While the city council agreed in principle with several of the new funding sources, the only specific program adopted was a transportation impact fee. These fees were adopted at a rate equal to 30% of the maximum allowable rate, resulting in substantially lower revenue than was originally anticipated (even separate from the unforeseen effects of the subsequent recession and decline in development activity). In short, the TMP is currently substantially underfunded, leading the city to consider reexamining the project list, the growth forecasts, and possibly its LOS standards. This will not likely occur until the next TMP update. In the meantime, the credibility of the TMP has been brought into question.

The new planning paradigm would have explored the realistic funding options even earlier in the planning process, along with specific examination of other constraints, such as right-of-way and LOS options. More specific tradeoffs between modal LOS might have reduced the roadway widening needs, which consumed a large portion of the total TMP costs. In return, the impact fee rates might have been lower, leading to a broader consensus on their desirability within the community.

EMERGING CONSTRAINTS LEADING TO A PARADIGM SHIFT

Transportation professionals are increasingly being asked to plan transportation facilities to serve multiple, and often conflicting, objectives. These varying objectives can include the following:

- Accommodate non-auto modes
- Minimize vehicle miles of travel (VMT) per capita
- Reduce energy used for travel
- Decrease air pollution and greenhouse gas emissions
- Increase travel choices through land use location efficiency and network connectivity
- Improve resiliency of transportation network
- Manage traffic flow to preserve mobility (optimize existing network)
- Invest in transportation network expansion that supports sustainability goals

As an example, below we describe the effects of providing a transportation system that is appealing to non-auto modes. Meeting this objective can run counter to providing

uncongested roadway operations. Under the new planning paradigm, this emerging constraint would be considered when developing a transportation plan.

Accommodating Non-Auto Modes

The traditional planning paradigm focuses on a single mode: the automobile. However, while most comprehensive plans endeavor to maintain smooth roadway operations, they often also support competing values, like creating bicycle and pedestrian environments, increasing transit ridership, maintaining open space, and attracting residential development in the urban core.

Despite these multiple objectives, most long-range plans apply vehicular LOS as the primary design criterion for transportation facilities. Jurisdictions often require that transportation facilities be designed to achieve a specific vehicular LOS without recognizing how roadway size influences urban form. However, with increasing congestion, this typical practice becomes more problematic, as the size of infrastructure needed to maintain desired performance thresholds like vehicular LOS can increase as well.

Some communities have begun considering the experience of non-motorists as a constraint in their planning paradigm. For example, the City of Davis, California allows downtown roadway facilities to operate at LOS F during peak periods. City leaders lowered the vehicular LOS policy to maintain a downtown that is inviting to pedestrians. This was also the rationale for a similar LOS policy in Kent, Washington, as described previously. Moreover, the City of Chico, California, in its ongoing comprehensive planning process, is considering establishing a standard that no roadway should exceed four-lanes in width. This standard is being considered in part to ensure that roadways maintain a character conducive to non-auto modes. As Chico continues with its comprehensive planning process, this constraint may affect where development is planned and what level of vehicular LOS city leaders accept.

Considering Community Values

Another trend in the new paradigm is to explicitly incorporate a range of community values into the planning process alongside the constraints. While this might seem like an obvious action, the facts point to many transportation plans being developed without much consideration of community values. Community values should form the basis of the planning goals. Subsequently, the plan should consider the tradeoffs inherent in the competition between the values. The following example from Sacramento summarizes this alternative approach.

Sacramento River Crossing Study

The Sacramento River Crossings Alternatives Study (2011) started with an evaluation of the following constraints to identify potential opportunities for new crossing locations:

- **Environmental** – These constraints include biological (i.e., plants, animals, water, and air quality) and cultural resources that are regulated by federal, state, and regional agencies.
- **Physical** – These constraints include natural and manmade physical features that would influence the feasibility or cost of constructing a new crossing.
- **Land Use** – These constraints include land uses that have a special status or sensitivity that would influence the feasibility or cost of constructing a new crossing.

The constraints were based on a review of available information and input from the stakeholder advisory committee. The main product of the constraints and opportunities analysis was a technical memorandum that included a preliminary map of potential crossing locations and modal options for each crossing.

The subsequent alternatives analysis focused on evaluation criteria that were linked to specific community values identified early in the study process based on adopted local, regional and state plans, as well as stakeholder input and internet-based public survey. This approach ensured that the alternatives analysis would relate directly to the community values expressed by stakeholders and the public. Accessibility, connectivity, and mobility were the community values that resonated most strongly with the stakeholders, thus verifying the importance of transportation criteria used within the overall evaluation.

CONCLUSION

This paper discusses the evolution of a new approach to planning that adapts to the constraints—financial, political, and environmental—pushing transportation planning in a new direction. The new planning paradigm also explicitly considers community values in a process designed to develop a financially-solvent and politically/environmentally feasible transportation plan. By requiring that the feasibility of a transportation plan be examined prior to adoption, the new planning paradigm provides a more realistic view of community mobility for all modes. Transparency is the hallmark of good planning. The new planning paradigm provides decision makers with tools to better manage community expectations for growth and service levels. The experience to date indicates that the public also appreciates the frankness of this approach, giving them some realistic tradeoffs to consider, rather than only a grand vision.

Authors

Donald Samdahl, PE, PTP, Principal, Fehr & Peers, 1001 4th Avenue, Suite 4120, Seattle, WA 98154, 206-576-4242, d.samdahl@fehrandpeers.com.

Don specializes in producing transportation plans for large and small communities in the Pacific Northwest. He has been actively involved in implementing the State's Growth Management Act, including extensive studies of concurrency and impact fee programs. He is currently applying the principles described in this paper to Transportation Master Plans throughout the greater Puget Sound Region.

Julie Morgan, AICP, Principal, Fehr & Peers, 100 Pringle Avenue, Suite 600, Walnut Creek, CA 94596, 925-930-7100, j.morgan@fehrandpeers.com.

Julie works to develop long-range transportation plans and funding strategies for cities and counties in northern California. Her particular areas of specialty include developing travel demand forecasting tools, improving the sensitivity of existing travel forecasting methods to new land use characteristics, and developing defensible impact fee programs to support a community's long-term transportation infrastructure needs.

We would like to acknowledge contributions from Fehr & Peers colleagues **Kendra Breiland** and **Ronald Milam**, who were the genesis of the new paradigm concept.

Endnotes

Breiland, Kendra and Ronald T. Milam, *A New Transportation Planning Paradigm: Constraints-Based Planning in Response to the Continuing Decline in Transportation Funds*, published in The Practicing Planner, Vol. 7, No. 2, 2009

City of Manteca, CA, *Development Services Action Plan,* January 2008
http://www.ci.manteca.ca.us/Final%20Development%20Services%20Action%20Plan%20_Manteca_.pdf.

City of Kent, WA, *Transportation Master Plan*, 2008
http://www.ci.kent.wa.us/content.aspx?id=1318&terms=transportation%20master%20plan

Fehr & Peers, *Sacramento River Crossings Alternatives Study*, Cities of Sacramento and West Sacramento, February 2011