Infrastructure Case Studies

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Building infrastructure in the United States remains a pressing challenge at the local, state and federal level. The level of funding for infrastructure has fallen from 4.6 percent of the GDP in 1968 to 2.8 percent of the GDP in 2018.

The intergovernmental systems approach of the 1960’s through 1990’s no longer address the changing realities of reduced federal funding, limited local and state funding options, increased environmental mitigations, and changing demographics- reduced fertility rates, slower workforce growth and more older population, coupled with increased demands for improved traffic flow, increased goods movements and just and on line purchase of goods, water availability, improved air and water quality, electric grid protection, and addressing climate change impact on increased wildland fires and rising sea levels.

The varied approaches to building infrastructure over the past five decades, has the appearance of incoherence and consistent budget overruns and delays. More importantly the current structure of stove piped programs cannot deal with the speed of change and complexity of the above challenges.

A more detailed analysis of successful projects finds a set of 10 tools that address the challenges of building large scale projects.

This varied set of cases illustrate recurring features in the success of building the Infrastructure. The cases address a similar set of 10 challenges that need to be solved for the construction investments needed to support sustainable growth, economic development, and environmental quality of the United States nationally and in each of its states, regions, and local governments. For each of the features the successful use of the feature/ tool will be described as well as problems and difficulties that have arisen in their use.

1. **Focus on Outcome**: improvements with minimal undesirable side effects
2. **Communicate**: structure the process for explaining the problems, strategies, policies and results
3. **Prioritize**: evidence drives choosing high-consequence problems
4. **Solve Problems**: at the level that is closest to the problem with agility and accountability
5. **Work Across Silos**: breaking down and pursuing opportunities across silos
6. **Share Data**: data, analytics, and measured trials inform decisions and actions
7. **Add Value to Knowledge**: improves decision making at each level
8. **Financial**: incentives and disincentives
9. **Leadership**: relationships, strategy, experience, and negotiations
10. **Equity:** focus on improving societal equity
11. ***Focus on Outcome****: improvements with minimal undesirable side effects*

Goals, outcomes that are measureable in time to completion and amount of improvement, relevant to individuals and geography that are expressed in terms that are understood and can be used as a starting point for decision-making. The outcomes can be used as a basis determining what actions are needed by all the participants and can be used for determining and avoiding undesirable impacts are the starting point for an intergovernmental initiative. Federal and State actions have been actively under development for the past fifty years and have been the cornerstone of infrastructure and mitigation progress.

Example: Chesapeake Bay restoration that is home to 18 million people, 64,000 square mile watershed, the largest estuary in North America and supports more than 3,600 species of plants, animals and plants. Involves six states, District of Columbia, numerous Federal agencies, a vast range of organizations and partners both public and non-profits. Standards and outcomes create the dynamics for both regulatory and voluntary actions of the participants. The water quality standards established by the Federal Government and the States became the goals and waste load analysis of the best management program (BMP) was evaluated so that standards could be achieved, forming the driver and catalyst for the entire initiative. A recent review of this program at the ASPA annual conference in 2019, revealed the change in sea level and estuary level rise and current changes is undermining some of the improvements in the past. Changes in weather and atmospheric rivers that are rising are significantly altering the hydrology of the rivers flowing into the Bay, increasing runoff and pollutants. This change in hydrology from climate change has rendered the entire methodology for doing waster load analysis useless. (This problem exists in the rest of the United States).

Example: Los Angeles region Air Basin, South Coast Air Quality Management District, involving the four of the largest counties in the country and the worst air quality in 1950’s in the world. Standard and goal setting have been set by State and Federal agencies and performance goals have been used by regional bodies to enact local controls and mobilized the largest transit and growth management program in the country and controls have been Improvement in the basin has been significant. One of the difficulties in the standard setting process is the lack of a standard for small scale particles, i.e., less than 2.5 milliliters- called nano particles. In the South Coast these nana particles are mostly derived for diesel combustion. The particles are so small that you can’t see them, and they are extremely harmful to health and children. The pollution you cannot see may be more harmful.

Example: Alameda Corridor rail cargo involves the Ports of Los Angeles and Long Beach and the corridors that move freight both highways and throughout the nation. Air Quality standards, accessibility, traffic congestion, cost and speed performance standards were established for the immediate areas near the port, throughout the region and across the country. These performance goals were determined by public agencies with active participation of the private sector. These standards were used to determine investment needs and air quality mitigations. The nano problem described above remains, primarily in goods movement. The investments in the corridor are for modes that use diesel driven trains that are still harmful to the region.

1. ***Communicate****: structure the process for explaining the problems, strategies, policies and results*

Political leadership initiated the communication making the case for the need, the benefits, and the process for success. When the conversation did not involve the correct geography, or the correct constituencies only partial success was achieved. In all cases this characteristic again is essential.

Example Chesapeake Bay: While water quality standards were set by the multiple states in the 70’s it wasn’t until the governors of the states involved, including Fellow Parris Glendening of Maryland, and governor Tom Ridge of Pennsylvania formed a tri-state commission. The driving force was a need to restore a fishery industry in the bay that was in decline manly due to the agricultural and urban expansion in the watershed. The key elements of this conversation are voluntary and adaptive to vision covering economic sustainability. Stakeholder input is guaranteed, and flexibility, transparency and accountability are essential, with trust being the glue that holds the agreement together. (See #4 below)

Example Los Angeles region air quality: While the Federal Government, EPA, under court order prepared the first plan that had strenuous opposition, the legislature set up a new air district (AQMD) that partnered with SCAG the regional MPO and the State Air Board) to conduct the conversation. The result was a transformation in all pollution sources to correct the problem. The entire geography of the air district was covered. Prior to the AQMD the controls were country by county. Resulting is a change in the economic base of the region and controls on almost all sources. Federal sources are still not controlled at the level needed. The lack of Federal controls has resulted in the large amounts of NOX pollutants from planes, trains and trucks which is the largest uncontrolled portion of the pollution inventory. Furthermore, recent policies of the Federal government are aimed at rolling back the States authority to set controls needed to achieve health standards and controls needed for CO2.

Example Alameda Corridor: The conversation began in a process initiated by the leadership of the Los Angeles County Transportation Commission forming a Task Force in partnership with the leadership of the Southern California Association of Governments. Currently the logistics regions in the country do not have any forum to conduct a conversation on the needs of this critical piece of our infrastructure. Furthermore, state boundaries and the difficulty of including railroads into decision-making is a limiting factor. The Alameda Corridor covers only a portion of the region. Other parts of the region are still struggling to address the problem and the entire corridor suffers from use of the wrong fuel source- diesel. The results of the conversation were a path breaking project with significant private sector funding that addressed the goods movement issue near the but the problem is still one of the most critical in the region, The speed of movement of containers and the time savings to customers of railroads led to action in the region.

1. **Prioritize**: evidence drives choosing high-consequence problems

Data, evidence and analysis developed by public agencies brought value added knowledge to decision-making at each level to drive the conversations. In each of the three examples this data was critical. Impacts on the economy, environment, people and geography had a substantial impact. The specifics of each are illustrated.

Example Chesapeake Bay research by the states on the impact that storm water runoff from the developing portions of the basin were the initial impetus for the states getting involved in the effort. This was complemented and reinforced by EPA and state involvement on agricultural runoff, particularly nutrients on reducing dissolved oxygen in the bay. These impacts were seriously impairing the oyster, crab, and fishing industries in the bay, both commercial and sport fishing. This evidence was the driving force.

Example Los Angeles Basin Air Quality has a long history of research findings that led to the intergovernmental initiative. Caltech professor Hagen Schmidt discovery of lead from gasoline was the initial driver that started the air quality efforts in the early 60’s and the establishment of the state standards that proceeded the federal standards. EPA’s continued research evidence on health impacts and the work on catalytic converters on autos were major contributors to the progress, particularly the provisions in the 1977 Clean Air Act. Recently the evidence on lung and asthma impacts of particulates, especially small-scale particulates is a driving force on removing diesel combustion in the basin. The research units of the Universities in the Region are the primary source for developing this data on nano particles. There is a significant absence of Federal Research on the subject.

Example Alameda Corridor benefitted from the research and evidence on inventory management in the US and the time savings impacts that improvements in logistics was equally important in convincing industry that the expenditures that the corridor would provide were justifiable. The evidence on the number of Congressional districts served by good shipped through the Alameda Corridor was influential in facilitating Congressional support. Locally, the data on reducing air pollution and wait times from vehicles at grade crossings was essential. The research of Robert Leachman from the University of California on how logistics is changing the economy and is supporting the purchasing habits of the American Consumer is an extraordinary example of how data was used to develop the public policy leading up to the Alameda Corridor. His current research in the area is showing deficiencies in the regions and nation’s approach to managing logistics traffic, which is one of the key unresolved issues in the nation. His work led to an understanding of the transloading of international containers (40 feet in length) into domestic containers (53 feet in length). To gain efficiencies a 24-hour cross dock move was made, to deal with the new purchasing behavior, warehouses with sorting were created. These new transloading facilities are distributed all over the region. As a result, all the ports growth is now being moved by trucks not by trains, with the alameda corridor not achieving its growth projection and facing financial losses.

1. **Solve Problems**: at the level that is closest to the problem with agility and accountability

Each of the issues discussed in this paper involve all three levels of government taking action and being part of the solution. The governance structure for local decision making included municipal and county representation, as well as large city and small city representation. The governance draw from elected officials closest to the problem, with decision-making as entire boards or sub-committees to act quickly to develop information or structure decision-making.

No single level was responsible for all of the progress. If there is a factor that caused change is that people and land/geography where the problem exists are affected causing political leadership to create an agile and flexible solution to be created that is accountable to those people and land. What is important is that legal authority and leadership that each level possess is contributed, that there is mutual accountability of all the levels of government and a partnership is created. If any of the levels views their contribution as more important and trust and respect is lost or with-held the effort will falter.

Example Chesapeake Bay exemplifies the catalyst at the local level which was the adverse impacts on the bay and its wildlife and its economy. The solutions required the involvement of state holders, a transparent process, mutual respect and trust. The Bay Commission used its own resources to implement bay protection and restoration. An executive council composed of representatives for all nine agencies involved. Since much of the implementation is by the partners, there is a management structure that co-ordinates and reports back to all the parties carrying out voluntary management actions. Several of the following elements further explain why the effort has been so successful.

Example Los Angeles Basin Air Quality has a four organization partnership that address the three sources of pollution: for stationary source regulation and overall planning and policy setting the Air Quality Management District; for mobile sources the State Air Resources Board who also reports progress to the Federal Government which also has responsibility for Federally controlled sources-trucks, trains, vessels; and the MPO the Southern California Association of Governments which has responsibility for growth and transportation sources. To be effective required all the parties carry out their responsibilities to meeting the State and Federal Standard setting process. The basin has made significant progress but there are still gaps in the regions control program, particularly Federal sources, which will be discussed in other categories. On balance the “agile” system is flexible and provides a degree of accountability to the basin. The challenge of mutual accountability to the people and the land remains unresolved. The lack of participation of the Federal Government is precluding solutions to know problems and is threatening the progress made to date.

Example Alameda Corridor faced the challenge of mutual accountability even more acutely than the Air Basin itself since the source of the problem is primarily under the control of Federal legal authority, primarily Inter State Commerce and Federal emission controls. The Alameda Corridor Authority was established by the Metropolitan Planning Organization to address the problem of trains accessing the Port, tying up the surface street traffic in communities surrounding the Port in a region with a highway system was designed prior to the development of the global trade era. With two thirds of the nation’s freight moving on the regions highways they are literally being crushed by the volume. The Authority is a joint-power agency of the two-host cities, Los Angeles and Long Beach and their ports serve on the Board. The project was based on performance productivity gains and are part voluntarily by the railroads and the beneficial shipping clients.

1. **Work Across Silos**: breaking down and pursuing opportunities across silos

Intergovernmental problem solving is almost by their very nature cross boundary issues involving solutions to more than one issue at the same time involving many entities. So, the term wicked or sticky problems is generally what they are called. Solutions require that silos or single categories of programs must be addressed simultaneously.

Each of the case studies described involves crossing boundaries to the extent possible. Our programmatic approach to problem solving creates boundaries that are difficult to remove. Our problem-solving approach of the past century of breaking problems into sizeable bits as a management and program approach creates even more silos and limitations. Finally, our desire for decentralization and local control creates even more limitations. As financial resources have become scare there is an increasing need to look to more efficiencies by putting problems together and solving them through synergy.

Example Chesapeake Bay solution is based on storm water control, agriculture runoff, habitat restoration and economic development. The strategies that were pursued by the Commission were aimed at addressing the loss of oyster industry in the bay alone with a significant decline in the sports fishing industry in the bay. The major sources needed to be controlled were agriculture sources in the upper states and around the bay. All of these industries were important in the seven states. The statutes of the Federal and State governments did not spell out regulatory frameworks for implementing agriculture run off and the storm water runoff regulations were cumbersome. Thus, a voluntary strategy was primarily used. The approach taken follows the concepts and theory of “Common Pool” strategies developed by Elinore Ostrom similar to this framework. The integrated program implemented with success was chronicled in a NAPA study. The Commission is now facing sea-level rise which is adversely affecting storm water protection and pollution runoff but assisting in habitat restoration.

Example Los Angeles Basin is essentially a cross silo problem involving almost every issue affecting the built and natural environment: growth, infrastructure, energy, economic and community development. New laws have been enacted to facilitate this boundary crossing. State law SB 375 was based in part on the work of SCAG in its growth plan for air quality, requiring that local growth plans calculate the vehicle mile , energy reductions and the air emission that their local land use plans create be quantified and co political power of the railroads and the lack of state and regional authority over these sources. Additionally, transloading of containers caused by changes in the supply chain consistent with air quality goals including CO2 goals.

Studies have shown that the low cost of money is enabling car ownership to go up along with the new TNT’s is acting as a counterforce. Economic policies and business initiatives at the national level are having unintended consequences. The continued increase in congestions in this and all metropolitan areas in the country points out the need to create additional strategies on how we use scarce urban land, how we incentive behavior-described below, and the need for new technologies.

Example Alameda Corridor likewise is a transportation, air quality, economic development, ground water clean-up, and energy integrated issue. At the time of the development of the project the energy portion of the issue was not successful. SCAG and the State Public Utility Commission set forth a strategy to electrify the railroads in the region but were thwarted by the technology have shifted much of the movement to trucks, who also burn diesel, causing particulate emissions seriously affecting the air quality. Emissions from trucks, trains and vessels is now becoming the largest portion of the basin’s emissions. Without an energy strategy, the region will not successfully address one of the most serious issues in the region. An investment program aimed at building grid and smaller scale batteries is now under development in the basin using new agile governance structures. The State and regional strategy is to develop renewable energy that is lower cost than traditional sources and to use market forces rather than regulatory approaches.

1. **Share Data**: data, analytics, and measured trials inform decisions and actions

Large GIS systems sourced by both public and private organizations, including satellite data are now available to government and private decision-makers. The digital revolution is altering the planning processes of governments at all levels. Goals and performance indicators are now transformed by analytical frameworks that allow quantification and measurement of. outcomes Included in these frameworks are evaluations of best decisions, including the effectiveness of alternatives and resources spent.

These same analytics can be used to assess the performance of private investment and determine nexus analysis for private investment decisions that allow for creating funding streams that amortize debt financing structures. This allows the intergovernmental partners to understand the best use of intergovernmental grants and assistance as well as private investments that can be part of the financing of public goods. Monitoring data allows implementation tracking for both programmatic performance as well as management tracking. Monitoring and tracking create a way of identifying high performing areas and the identification of success stories and innovations that can be shared.

Example Chesapeake Bay used data and analytics to establish the vision of each state involved in the effort which then formed the agreements of the multi-state effort. Extensive monitoring systems were established by each of the states that are used to track the progress of the implementation efforts of both public and private actors on an annual basis. Since most of these effort on voluntary monitoring and tracking is vital in maintaining these efforts. The transparency created by the extensive system is used to build trust among the parties and is extensively shared with all the parties, many are non-profit and community-based organizations that track the health and economic performance of the Bay.

Example Los Angeles Basin used extensive data and analytics to drive the four-agency planning and decision-making process. Without this tool, the effort could not have been undertaken. The Air Quality Management Planning Process is a consolidated data and analytical challenge. Monitoring both ambient and programmatic is undertaken to meet both regulatory requirements as well as maintain a public education program. The public interest and concern for clean air and health progress requires continual reporting and consultation on the part of all the agencies. This continual assessment process is creating an understanding of what is not being done and calling attention to these shortfalls.

Example Alameda Corridor and the deficiencies of the good movement investments of the region, traffic congestion, and the air quality implications are one of the areas drawing public attention and continual litigation under the regulatory provisions of the enabling legislation. Monitoring of progress has been one of the key tools used by public and non-profit agencies to create the attention and understanding needed to draw attention to this issue. The lack of progress and conflict in this area is not only harming the population near the port, most of whom are low income and minority but hampering the development of one the key industry in the basin that provide employment for this same community.

1. **Add Value to Knowledge** improves decision making at each level of government

The introduction of these case studies points out the changes that are occurring in our society, our economy and our environment. Each of the case studies was catalyzed and punctuated by increased value that altered decision-making and led to doing something to cope with the change observed. Many of the above factors or tools are involved in creating this knowledge, improved data and analysis, evidence that is picked up from looking at performance, looking at issues from a multi-purpose or non-stove piped perspective, but all these led to an educational process of bring this information to the decision-making process of the governmental leaders. The importance of this educational effort increases as complexity and increase in the rate of change increases. This process of adding value makes each of the cases described in this paper a work in progress. A reading of each of the cases to this point notes that progress was made but issues remain and some the cases the problem may even be worse.

Example Chesapeake Bay The new information on changes in weather causing hydrology and estuary levels to change is creating a need for an educational process to inform decision-makers on how to approach this entire new challenge to the bay. The same is true for every river, estuary, lake and ocean in the country. We need new research, information and an educational process so that we can deal with the risk and uncertainty that these changes are creating so that this decision-making of all the levels of government can begin to deal with these impacts. The current value of information on these changes is one of greatest challenges, particularly for extreme weather conditions (climate change) is one of the greatest challenges that we face as a society. Developing this value in our information should be our highest priority.

Example Los Angeles Air Basin The challenge of needing a new energy source for health protection as well as the reduction of CO2 for climate purposes as well as the increased trip making of cars and trucks that are increasing congestion is requiring major modification of how the region approaches meeting these new challenges. We are now just beginning to understand these issues and the educational process need to inform decision-makers at all levels of government is just beginning.

Example of the Alameda Corridor The corridor is facing several challenges that must be dealt with given the issues described above. First dealing with the new transloading and marketing behavior of the economy and second dealing with the energy source driving the logistics system. We are now developing the data and information and the evidence of health impacts. Translating this into an educational program so that decision-makers of all levels of government can deal with this issue is among the more serious challenges that southern Californian face. New strategies are now emerging that is improving the value of information that is going to decision-makers at all levels.

1. **Financial**: incentives and disincentives

Currently 78% of infrastructure is funded with non-federal revenues which highlights the need to develop a true partnership among the levels of government. Furthermore, to meet America’s needs these investments will need to increase sharply by creating new partnerships and arrangements among the sectors. Federal grants will fall far short of addressing infrastructure needs necessitating infusion of private capital and contributions from state and local governments. This will need to be accompanied by expanded options for user- and beneficiary-based financing, including user charges and value-capture (e.g., tax increment) financing, as well as innovative options to reduce market risk and increase access to private capital. These tools are essential for several reasons. First, current financial tools are insufficient to deal with the operation and maintenance of the existing system. A national crisis! Second, we are beginning to understand that without pricing signals and changing consumer behavior we cannot not address the challenges in all the examples. If these financial tools are to be used, then we must look at the way we organize ourselves. Lastly an improved governance decision framework that supports budgetary rigor and transparence, identify priorities and risks and avoid costly financial workarounds that will increase the value of money expended.

## What methods are available to allow greater flexibility in how public and private entities work together while still ensuring transparency and accountability to the public and the financial community? Over the past decades’ governments at all levels have been experimenting with new governance approaches to address this growing crisis. The best practices and lessons learned if applied nationally could address America’s infrastructure and economic development goals.

## The successful experiments have a common theme, new institutional arrangements that enable revenue streams of users- and beneficiary based- financing to fund integrated investment programs that enable goals-both national and local- to be funded. Effective partnerships, particularly for significant investments, require all levels to participate and each level contributing what they can do best

## Example Chesapeake Bay each of the original states determined that the Bay Conservation Program was of significant importance that State General Fund resources are programed to support the operations of the program. The implementation efforts are primarily voluntary of both governmental entities and the private sector. The analytics and follow-up monitoring are sufficient to convince expenditures of the bodies involved.

## Example Los Angeles Basin the operating resources are derived from the annual budgets of the agencies which are a combination of general fund monies at all levels, fines and penalties collected by the regulatory agencies- state cap and trade, fines by the AQMD, and State and Federal grants to SCAG. Infrastructure shortfalls and difficulties supporting growth and energy programs are raising the need for innovative funding programs. The Governor and the legislature are now experimenting with new intergovernmental and cross-sectorial programs to fill this gap, enabling Enhanced Infrastructure Financing District’s to be formed, with the board of the Districts call Public Funding Authorities. The categories described in this paper have been used to design this legislation. These new funding authorities have the capacity to bring new revenues to the table. They also create new incentive structures that will alter the way that consumers and users relate to the behavior of the system. They can be used to bring new technologies into the system. Finally, they can create more accountability and transparency. The core principle of behind these systems to organize the units of governments so that revenue streams can be collected from beneficial uses and increased value capture that can be used by these new governmental entities to issue debt. The mission of these boards are financing and accountability and use other public and private entities as implementors.

Example Alameda Corridor is financed totally by fees on containers that used many of the categories in the design of the structure. The limitations on scope and lack of an energy strategy for the program, described above, is calling for the use of the EIFD structure to move to correct for these deficiencies. The investment program will alter the mode of moving containers on free flow shuttles to transloading center near the port. The land for these centers is created by utilizing the land under existing kV power lines and moving the lines to superconducting cables on the shuttle structure. Superconducting magnetic energy storage system (SMES) batteries, grid scale, are being deployed on the free flow shuttle infrastructure to store renewable energy for the port region and smaller scale batteries are being developed for trucks and trains.

**9.Leadership**: relationships, strategy, experience, and negotiations

In complex, multiparty, multijurisdictional problem-solving, leadership is the key and essential ingredient both at the staff and policy levels. Individuals who know how to interpret the value of knowledge into actionable steps that multiparty and organizations can understand and move the agendas and power structure of existing agencies and jurisdictions, who have their own agendas and power bases. Without these leaders, the inertia of doing what historically is in place dominates and inertia desires to maintain the status quo. This is particularly true in periods of rapid change that is challenging the status quo. Whether large or small, bureaucracies operate to preserve their existing operations. For each of the examples, leadership was key.

Example of the Chesapeake Bay The Corps of Engineers initiated a five year $27 million dollar study authorized by Senator “Mac” Mathias, Democrat Maryland which was followed by multiple heads of the departments within the organizing states of Virginia, Maryland and Pennsylvania that played the analytical and educational role along with several non-profits that conducted the initial planning and educational role that established the Chesapeake Bay Project. The Clean Water Act of 1982 had a separate section that reinforce and supported the effort. The policy leadership was provided by the governors of Maryland, Perris Glendenning and Pennsylvania Tom Ridge to form a Tri-State Authority that morphed into a seven state Compact. Without policy champions the effort would not have come to pass.

Example Los Angeles Basin Air Quality Los Angeles County along with the outlying counties had a strong history of attacking a highly visible problem, air quality so bad you could not see the mountains surrounding the basin. In 1970’s several initiatives happened, the first Mary Nichols sued the federal government to prepare a Federal Plan for the entire basin to meet Federal Standards and won. While highly unpopular the effort and local leadership from non-profits and environmental interests led to the passage of the Lewis Act, Assemblyman Jerry Lewis, creating a four county AQMD.

Example Alameda Corridor Authority The recurring discussion of participants and observers of the process to consensus building for developing the Alameda Corridor was the role of leadership from the start. The initial staff person, Gill Hicks was seen as a catalyst for engaging varied communities, including the large cities of Long Beach and Los Angeles, as well as the considerably smaller seven cities along the corridor for the cargo rail line consolidation. Hicks was central in developing consensus on the problem identification, preferred solutions, and mechanisms to connect the varied public entities as well as to successful negotiate with three separate railroad companies. Councilwomen Chris Reed, Santa Monica and Jackie Bacharach, Rancho Palos Verdes, who were chairs of committees at SCAG and the Los Angeles Metropolitan Transportation Commission moved the work of Gil and other staff through the complex decision-making of both agencies. Their efforts were critical in forming a new agency call the Alameda Corridor Transportation Authority (ACTA).

Similarly, in the construction of the initial subway line in Los Angeles, the Executive Director, John Dwyer was specifically hired because of his proven abilities to navigate and negotiate the federal funding system to support one of the last federally funded new start construction projects in the United States in the 1980’s. Dwyer also developed what became the successful strategy of receiving funding for Minimal Operating Segments from the federal government, as opposed to an initial open ended commitment to funding the entire system. Dwyer’s strategy innovation led to federal funding of three connect segments forming the backbone of the modern Los Angeles regional rail system.

**10.Equity:** a focus on addressing health, economic, and social marginalization

These case studies on the natural and built environment all have positive and negative impact on the equity and social issues facing the two geographies.

Example Chesapeake Bay All the industries protected have lower- and middle-class incomes which is significant in light of current economic trends of job losses in these quintiles. Given the approach to control the pollution sources were primarily voluntary the Commission worked to find BMP’s that are not onerous, but still effective, on all the sources, and was successful. Improving the bay and sustaining the economic base is a highly significant accomplishment. The new problems created by extreme weather conditions is creating a new equity threat.

Example Los Angeles Air Basin The success of the program has both positive and negative impacts on the equity issue in the basin. Health and quality of life has been improved for all the population in the basin, particularly for the eastern portion of the basin which have lower incomes. Unfortunately, the nano particle impacts which are primarily discharged on highways, rails and ports are having a disproportionated impact on lower income populations that are located adjacent to these sources. The clean-up program is one of the factors that contributed to the decline in the manufacturing sector in the basin by increasing costs. Southern California is the largest manufacturing concentration in the nation. Over the past thirty years the region has lost a half a million jobs and is struggling to develop jobs that can replace the income lost. In the past ten years sixty percent of all jobs created in the region pay $18 per hour or less, middle income jobs, $18- 30 per hour have declined by 80,000 and forty percent of jobs pay above $30 per hour. The result is that the majority of the population cannot afford southern California. It is important to note that the clean-up is one of many factors causing this economic base change.

Example Alameda Corridor The Alameda Corridor case advanced equity across three dimensions. At the project level, the construction of the grade separations improved air quality, through reduction of traffic congestion in the corridor cities. In addition, the project remediated significant groundwater contamination affecting several cities. For each individual city, the project funded city designated improvements. At the individual level, the project funded construction jobs training and placement program. The inability to deal with the energy source and continued nano particle emissions which is primarily impacting lower income communities and is stifling growth in the logistics sector is continuing impact on lower- and middle-income populations. The employment opportunities for these quintiles is lagging and the communities have higher health impacts.

The Los Angeles rail project started in 1978 with a commitment to serve economically marginalized communities. The construction of a light rail line starting in the 1980’s provided rail transit to South Los Angeles and extended over 30 years of construction to serve East Los Angeles, as well as other communities with transit dependent workforces.

## **Conclusion**

## The categories in the framework are both important tools separately but together, with the exception of form a framework for how we can think of organizing ourselves to address the infrastructure issue, as defined in this paper, to be solved. The examples show how the framework were used by all the levels of government and by the private and non-profit sectors to solve problems in the past. There are also suggestions of how this framework could be used in future legislation at both the State and Federal levels. The framework enables us to understand the dynamics that led to success and as well as unresolved issues.

## The most significant issues are: the failure of the funding paradigm used in the nation is not keeping up with maintaining the existing system let along provide for the new investment needs, and the changing demands placed on these needs; the partnership among the levels of government is not working and is not flexible to allow the dynamics success outlined above to work; the use of infrastructure to be a driving force to deal with the income inequity that is fast becoming one of the great challenges facing the nation.

## A separate legislative proposal that has been developed by the NAPA fellows who participated in developing these case studies, is attached that draw on the lessons learned in these case studies.

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