

PPD 636

Infrastructure and Modern Society

Fall 2013, 2 units

Meets as an intensive: November 2-3 and 23-24, 2013

Readings will be posted weekly on Blackboard and form the basis of on-line discussions

Room: TBD

Richard G. Little, Price School of Public Policy

Office Hours: I am located out of state and returning to Los Angeles to offer the course so conventional office hours are not feasible. However, I will be available throughout the semester via email and telephone if you have questions on the readings or wish to discuss something.

Phone: 703-582-0317

E-mail: rglittle@usc.edu

Basic Purpose of the Course

Infrastructure remains in the news, whether as a vehicle of economic stimulus, an investment opportunity, or one of the many things that state and local governments cannot afford to build or maintain. Modern economies exist as such because of their ability to move goods, people, and information safely and reliably. However, the U.S. has not been able to harness sustainable revenues to fund the upkeep and renovation of existing systems and to provide new capacity. As a result, we must now face up to the consequences of years of neglect just when these systems are facing new challenges from natural hazards and expanded supply chains such as the opening of the enlarged Panama Canal. This course is designed to provide an overview of the role that civil infrastructure (e.g., transportation, energy, water supply and sewerage, communications) has played throughout history, from our earliest efforts at urbanization through the industrial age and the role it continues to play today in the quality of life and level of economic well being that people can achieve. The course is designed for students from diverse educational and professional backgrounds so that they can take away lessons that are germane to their area of interest. For example, students in the real estate program will learn how infrastructure influences land values and development potential; students of planning and public policy will be able to relate infrastructure investment to economic development, urban mobility, and hazard mitigation; engineers will learn how to shape projects and approaches that address a multiplicity of objectives and stakeholder interests. We will examine the concept of infrastructure as a socio-technological system, that is, one in which technological artifacts (hardware), human participants, and organizational frameworks and procedures are integrated to deliver needed services, sometimes without building anything at all.

What Students Will Learn

The underlying premise of the course is that infrastructure is a complex system composed of technologies, organizations, and individuals that delivers the vital services without which modern society cannot function. Students will learn that to provide services effectively, reliably, and cost-efficiently requires an understanding of many disciplines and the involvement of multiple stakeholders in the decision-making process. The course will encourage critical thinking within a systems context and attempt to integrate principles from engineering, planning, municipal finance and economics, the social, policy, and decision sciences, and risk management. Because infrastructure decisions made today will reverberate for many years, it will discuss the concept of intergenerational equity and how traditional methods of analysis may fail to capture the full range of costs and benefits that occur in different time periods.

Exams and Grading

The final grade will be determined by familiarity with the reading material as demonstrated by knowledgeable participation in classroom discussions, homework, and a final exam.

The final grade will be determined based on the following allocation:

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| 1. Homework | 30% |
| 2. Class participation | 10% |
| 3. Final exam | 60% |

Teaching Approach

Infrastructure draws from many disciplines and fundamental principles are best learned through demonstration, discussion, and critical evaluation. Therefore, the course will combine the readings, lectures, and the interaction between the students and between the students and instructor in a seminar format. Because of the intensive nature of our classroom interactions, it is imperative that students keep up with the weekly readings during the semester, attend all classroom sessions, complete homework assignments, and participate actively in class discussions. Students are particularly encouraged to maintain awareness of on-going and emerging infrastructure issues such as funding and budgetary concerns, the conflicts between infrastructure operations and neighboring communities at the LA ports and LAX, and the potential impacts of climate change and natural hazards. Relevant infrastructure events such as the impact of Superstorm Sandy on the Northeast United States in 2012, California High Speed Rail, and proposed major water projects in California will also be discussed.

Student questions on the readings to be submitted weekly: *Prior to the classroom sessions in November, readings will be posted weekly on Blackboard beginning the first week of the semester. Students are expected to submit a question via email by Monday of the following week (rglittle@usc.edu) that each of the readings for that week raised for them. These don't need to be elaborate but they will form the basis for our Blackboard class discussions. From the questions submitted, I will select two or three to post on Blackboard*

and will expect everyone to participate in the discussion. This can be in the form of a comment, information sharing, or more in depth question. They should be typewritten and have your name at the top (Yes, people routinely neglect to put their name on their work.) This part of the course will comprise your mid-semester grade and will better prepare you for the lecture portion of the course in November.

Each 2-day classroom session will consist of three lectures, student questions on the readings, and group discussion of material led by pairs of selected students (Everyone will get to be on a discussion team!). These discussions will be the basis of the class participation grade and are critical to what you take away from the course. There is usually a good diversity of backgrounds in the class and these discussions will enable each of you to gain other perspectives on what are often complex and contentious issues.

Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me at the first session. DSP is located in STU 301 and is open 8:30 a.m. – 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Reading Materials

After teaching this course for 8 years, I have still been unable to find a suitable text that covers the breadth of topics discussed. Therefore, readings are drawn from academic and professional journals, professional manuals, and print and on-line media. The core readings shown below will be posted weekly on Blackboard throughout the semester but additional materials may be added.

- Lecture 1: Joel A. Tarr, “The City and Technology,” 2004,; “Drawing the Line at Power Lines,” *NYTimes*, 2/18/2012; Infrastructure: “Revamped transport links to plug in the world,” *Financial Times*, 2/8/2012. Y. Malik, A. Niemeyer, and B. Ruwadi, 2011. “Building the Supply Chain of the Future,” *McKinsey Quarterly*, January 2011.
- Lecture 2: J. M. Bauer and P. M. Herder, “Designing Socio-technical Systems,” *Handbook of the Philosophy of Science*, 2009. Little, R., 2004. “The Role of Organizational Culture and Values in the Performance of Critical Infrastructure Systems”;
- Lecture 3: Little, R. G. 2009. “Managing the Risk of Cascading Failure in Complex Urban Infrastructures” in *Disrupted Cities: When Infrastructure Fails*. London, UK. Routledge, Little, R.G. 2011. “Building Urban Resilience in East Asia.” Little, R.G. 2013. “What To Do While the Water Rises?” *Global Change*, April 2013.
- Lecture 4: Peter Gordon and Paige Elise Kolesar, 2011. “A Note on Rail Transit Cost-Benefit Analysis: Do Nonuser Benefits Make a Difference?” *Public Works Management & Policy*, 16:2 100-110. Robert Cervero and Erick Guerra, 2011. “To T or Not to T: A Ballpark Assessment of the Costs and Benefits of Urban Rail Transportation.” *Public Works Management & Policy*, 16:2 111-128. Lisa Schweitzer, 2011. “Benefit-Cost Analysis of Rail Projects: A Commentary.” *Public Works Management & Policy*, 16:2 129-131. [Background for those who need a refresher: Present Value, D.R. Henderson, 2008; Benefit-Cost Analysis, P.R. Portney, 2008]

- Lecture 5: Jacobson, C.D. and J.A. Tarr, 1996. "No Single Path: Ownership and Financing of Infrastructure in the 19th and 20th Centuries," in *Infrastructure Delivery: Private Initiative and the Public Good*. The World Bank.; Gramlich, E.M. 1994. "Infrastructure Investment: A Review Essay" *Journal of Economic Literature*, 32(3): 1176-1196. Little, R.G. 2010. "Beyond Privatization: Rethinking Private Sector Involvement in the Provision of Civil Infrastructure" in *Physical Infrastructure Development: Balancing the Growth, Equity, and Environmental Imperatives*, W. Ascher and C. Krupp, eds. New York, NY. Palgrave Macmillan.
- Lecture 6: Little, R.G, 2010. "More Stimulus Is Just a Band-Aid, the Real Transportation Issues Are More Profound." *Innovation NewsBriefs*, 21(21), September 24, 2010; Little, R.G. 2010, An Informational Summary on Public Private Partnerships; Little, R.G., 2011. "Are Public Private Partnerships for Schools Right for North Carolina?" Little, R.G., 2011. "A Sustainable Funding and Financing Strategy for Urban Infrastructure Renewal in China." Little, R.G. 2011.

The Instructor

The course will be taught by Richard Little, the former Director of the Keston Institute for Public Finance and Infrastructure Policy at the University of Southern California. He has over forty years experience in planning, management, and policy development relating to infrastructure and public facilities including fifteen years with the Office of Comprehensive Planning in Fairfax County, Virginia where he served as Director of the Planning Division. He has been certified by the American Institute of Certified Planners and is a member the American Planning Association and the Society for Risk Analysis. He holds a B.S. in Geology and an M.S. in Urban-Environmental Studies from Rensselaer Polytechnic Institute. He was elected to the National Academy of Construction in 2008 and was a member of California's Public Infrastructure Advisory Commission from 2009 - 2012.

Outline of Individual Lectures

Lecture 1 – The Role of Infrastructure in Society

This class will present infrastructure as the mechanism for the delivery of services essential to economic activity and personal well being. Historically, infrastructure projects have been promoted as the key to economic development and wealth building, particularly in the early days of the United States. More recently, the role of public spending as a means of job creation and economic revitalization has been widely promoted as in the 2009 American Recovery and Reinvestment Act. Opinions among economists differ widely but there is little disagreement that although good infrastructure does not ensure a robust economy, it is difficult to achieve and maintain high rates of productivity in its absence. The historical role played by infrastructure as a civilizing element and its importance to the development of North America will be discussed through the lens of three notable infrastructure achievements that epitomized the U.S. as a modern industrial state; the transcontinental railroad, rural electrification, and the interstate highway system.

Lecture 2 – Organization and Governance of Infrastructure Systems

The organization and governance of civil infrastructure systems plays a key role in the efficient and reliable delivery of services. Therefore, a holistic systems perspective on civil infrastructure must consider social and institutional factors in addition to technology. This class will examine infrastructure as socio-technical systems, which are the complex and capital intensive organizations that have been developed to meet the needs of modern industrial societies and how these organizations respond to cultural cues provided by their governance structures. For example, despite ample experience with many previous hurricanes and tropical storms, and many days advance warning of the path and size of Hurricane Katrina, critical communication and coordination links failed when needed most. Whether these failures were rooted in technology or organizational culture is an example of critical questions that must be answered if progress is to be made in dealing with future events.

Lecture 3 – Hazards, Risk, and Resiliency

Because civil infrastructure is so important to our economy and quality of life, it is of the utmost importance to government, business, and the public at large that the flow of services provided by infrastructure continues unimpeded in the face of a broad range of natural and manmade hazards. From the standpoint of vulnerability and risk reduction, it is also necessary to look beyond the effects of an event on a single system and instead seek to understand the nature and behavior of a complex, “system of systems”. This class will introduce the concepts of system interdependency, risk management, and resilience to infrastructure systems.

Lecture 4 – The Basis for Infrastructure Decision-Making

Infrastructure must satisfy multiple objectives and meet the needs of multiple stakeholders. It must also compete for funds from a finite resource base. This class will explore the methods available for framing and evaluating investment and management decisions for infrastructure systems beginning with the setting of goals and objectives through evaluation techniques such as benefit-cost and cost-effectiveness analysis, and the concept of robust decision-making.

Lecture 5 – The Provision and Financing of Infrastructure: Who Benefits and Who Pays

Alternative views of infrastructure as a public or private good drive much of the discussion of how it should be provided and paid for. This class will examine how this perspective has cycled over time and the very real impact it has had on public attitudes toward the financing of infrastructure. A traditional “public works” model will be discussed as will recent approaches to development exactions, privatization, public-private partnerships, and a related phenomenon, the privatization of governance embodied in services provided by private communities and homeowners and community associations.

Lecture 6 – Innovative Revenue Generation and Infrastructure Financing Methods

There is widespread agreement that much of the civil infrastructure in the United States is at or nearing the end of its useful life and requires extensive repair, rehabilitation, or replacement. Although estimates to carry out this work vary, it is not unreasonable to assume that the cost over the next 20 years will be several trillion dollars. Although much has been written to document the seriousness of this need and the magnitude of its cost, beyond recent fragmented attempts to involve the private sector through structured project finance, government at all levels has shown little inclination to move away from traditional infrastructure funding models. Recent proposals to raise the priority of infrastructure renewal and increase investment levels still look to the federal government to provide large amounts of stimulus capital through a traditional grantor/grantee relationship. However, regardless of the efficiency or equity of this traditional model, there is little reason to believe that existing revenue sources can deliver the funding levels necessary over the timeframes required to make a meaningful impact on the problem. This class will examine some of the recent alternative approaches that have been proposed for financing infrastructure.

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *Scampus*, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A. <http://www.usc.edu/dept/publications/SCAMPUS/gov/>.

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at <http://www.usc.edu/student-affairs/SJACS/>.