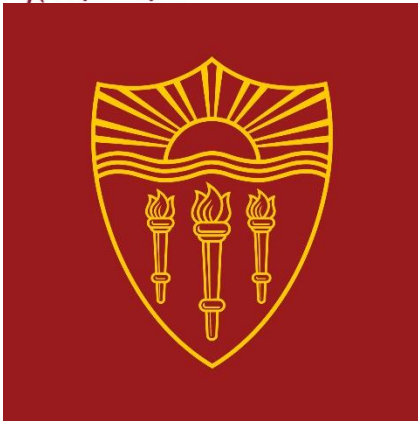


USC Viterbi

School of Engineering
*Sonny Astani Department
of Civil and Environmental
Engineering*



MANAGING AND FINANCING PUBLIC ENGINEERING WORKS

**CIVIL ENGINEERING 552 (CE 552) /
POLICY, PLANNING & DEVELOPMENT 552 (PPD 552)**

3 Units

Spring Semester 2021

Mondays 6:30 – 9:00 PM

Patrick Harder

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I. Purpose: This course is intended to introduce students to the major governmental and private sources for financing public civil works projects and to address some of the key issues in the management of such projects once underway. Specific topics covered include:

a. Sources of Federal, State, local and private funding for public works projects.

b. Traditional and “innovative” mechanisms for financing such projects.

c. The role of performance-based technical specifications in the innovative delivery of public works projects

d. The use of public-private partnerships to manage and finance such projects.

e. Legal and practical limitations on public-private cooperation in the financing and operation of public works projects.

f. Common sources of disputes on public works construction projects and methods to avoid or mitigate the impacts of such disputes.

II. Course Materials. The course will discuss such requirements primarily as they apply to civil works infrastructure projects (highways, bridges, rail, airports, power, etc.). As appropriate, however, I may discuss laws or cite examples relating to other types of public-works projects (including water infrastructure and public building works).

a. The primary text for the course is Delmon, Jeffrey, Public-Private Partnerships in Infrastructure, Cambridge University Press, 2017. I will also assign readings and videos via link to publications from various

governmental and academic sources, including publications from the U.S. Federal Highway Administration (FHWA). Among these publications are:

- b. [A Guide to Federal-Aid Programs and Projects: Current Programs and Projects](https://www.fhwa.dot.gov/federalaid/projects.pdf), available on the FHWA's Federal-Aid Program Administration website at <https://www.fhwa.dot.gov/federalaid/projects.pdf>.
- c. [Project Finance Primer 2010](https://www.fhwa.dot.gov/ipd/finance/resources/general/project_finance_primer_2010.aspx), available on the FHWA's Center for Innovative Finance Support website at https://www.fhwa.dot.gov/ipd/finance/resources/general/project_finance_primer_2010.aspx.
- d. Financial Structuring and Assessment for Public-Private Partnerships, located at https://www.fhwa.dot.gov/ipd/pdfs/p3/p3_primer_financial_assessment_1213.pdf.
- e. Public-Private Partnership (P3) Procurement: A Guide for Public Owners (2019), located at https://www.fhwa.dot.gov/ipd/pdfs/p3/toolkit/p3_procurement_guide_0319.pdf.
- f. Other individual articles and materials may be assigned to students for reading over the course of the semester. I will post these readings on Blackboard.

III. Course grade: The student's grade will be based on the following three factors:

- a. Class participation. Students are expected to engage in class discussions of lecture topics. Additionally, I reserve the right to call on any student during any lecture (10 percent).
- b. One essay assignment. For this assignment, students will write on a topic related to the management of a public civil works project during the project's design and construction phase. (25 percent).
- c. A case study presentation with accompanying narrative on the financing components of a major civil works P3 project (20 percent)
- d. A group negotiation project (15 percent).
- e. A take-home final examination (30 percent).

IV. Grading policy: Students will receive one of the following grades, based on the following levels of effort and initiative:

A: 95-100% of total points available in the class are attained. In addition to providing correct or defensibly correct answers to the assigned questions and

projects, all or almost all completed assignments must show intellectual and practical initiative (i.e., additional legal research to buttress your own arguments, analysis and refutation of counter-arguments, advancement and defense of "novel" arguments. Comments made in class should reflect similar preparation.

A-: 90-94.9% of total points available in the class are attained. The intellectual and practical initiative described in the above paragraph is present in most of the student's work and comments.

B: 85-89.9% of total points available in the class are attained. The required intellectual and practical initiative described above is present in some, but not most, of the student's work and comments.

B-: 80-84.9% of total points available in the class are attained. The intellectual and practical initiative described above is present in only a small portion of the student's work and comments.

C: 75-79.9% of total points available in the class are attained. Work completed by the student does not show any special intellectual or practical effort. Work is turned in late, hastily done, or is otherwise poor.

C-: 70-74.9% of total points available in the class are attained. Intellectual and practical effort by the student appears to be minimal.

D: 65-69.9% of total points available in class are attained. Students' work and class participation shows no practical effort.

F: Less than 65% of total points in class are attained, or student has violated the academic integrity provisions described below.

Assignment deadlines will be rigorously enforced. Late assignments receive 50% credit and assignments more than one week late without special arrangements with the instructor will receive no credit. There will be limited opportunities to make up credit lost due to late work by performing extra credit assignments as agreed to by the instructor.

V. Course content and schedule (subject to change):

<p>Session #1 25 Jan 2021 (Note: 18 Jan 2020 is a holiday – no class)</p>	<p>I. Course Overview</p> <p>a. My expectations and guidelines for course success</p> <p>b. Introductions</p> <p>c. Course content preview</p>	<p>Reading: Text, Chapter 1- <i>Introduction</i> (Page 1-27)</p>
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	<p>d. Questions and observations</p> <p>II. Defining infrastructure in an era of change</p> <p>a. Transportation infrastructure</p> <ol style="list-style-type: none"> 1. Highways 2. Rail 3. Airports 4. Seaports 5. Distinctions between movement of people and movement of goods <p>b. Water infrastructure</p> <ol style="list-style-type: none"> 1. Water supply 2. Water treatment 3. Drainage <p>c. Other key infrastructure sectors:</p> <ol style="list-style-type: none"> 1. Renewable energy 2. Broadband <p>III. Four key agents of change:</p> <ol style="list-style-type: none"> a. Global warming and climate change b. Global economic slowdown c. Rapid advances in technology d. Social equity movement and related backlash 	
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	<p>IV. What role do specialists having in change management?</p> <ul style="list-style-type: none"> a. Civil and structural engineers in design and construction b. Transportation engineers c. Transportation planners, including professionals in system management d. Professionals in business and finance <p>V. Introduction to public-private partnerships (P3)</p> <ul style="list-style-type: none"> a. Terminology b. Types of P3 Contracts c. Key participants in P3 transactions <p>VI. Group discussion</p>	
<p>Session #2 01 February 2021</p>	<p>The Federal planning, funding and financing process</p> <p>Guest lecture by Shant Boyajian, Esq.</p>	<p>Reading TBD</p> <p>Case Study assignment introduced</p>
<p>Session #3 08 Feb 2021</p>	<p>Basics of Infrastructure funding and financing</p> <p>I. Basics of public infrastructure funding</p> <ul style="list-style-type: none"> a. Differences between “funding” and “financing” b. Debt capital Market <ul style="list-style-type: none"> 1. Traditional transportation infrastructure funding c. Equity Capital Market 	<p>Reading: Text Chapter 5, <i>Financing PPP and the Fundamentals of Project Finance</i> (p. 89-107)</p>

	<ul style="list-style-type: none"> d. The role of rating agencies <ul style="list-style-type: none"> 1. Monoline insurance e. Collection of tax revenues and fees (Federal and State gasoline taxes) <ul style="list-style-type: none"> 1. Gas taxes 2. Sales tax increment 3. Development fees f. State and Federal grant programs g. International grant programs (“grant aid”) <p>II. Basics of public infrastructure financing</p> <ul style="list-style-type: none"> 1. Public finance (bonds) as default financing structure 2. General obligation bonds <ul style="list-style-type: none"> a. The concept of full faith and credit 3. Revenue bonds <ul style="list-style-type: none"> a. Dedicated revenue stream b. The concept of a revenue waterfall 4. Innovative finance (FHWA) 5. Federal loans and credit assistance 	
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	<ul style="list-style-type: none"> 6. Cost of capital considerations 7. Color of money considerations b. Financing as driving the decision on project delivery method <ul style="list-style-type: none"> 1. Performance based infrastructure <p>III. Should the private sector have a role in financing and management public infrastructure?</p> <ul style="list-style-type: none"> a. Potential benefits of P3 <ul style="list-style-type: none"> 1. Accelerated delivery 2. Risk transfer 3. Increased efficiency 4. Reduced instances of deferred maintenance 5. Incentives to adopt to emerging technology 6. Harness private sector innovation b. Potential pitfalls to P3 <ul style="list-style-type: none"> 1. Cost of capital and the importance of quantifying P3 benefits 2. Public opposition and the importance of a communication strategy <ul style="list-style-type: none"> a. Private control over public assets and 	
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	<p style="text-align: center;">public decision-making</p> <p style="text-align: center;">3. Labor opposition and importance of understanding the stakeholders</p> <p style="text-align: center;">a. Distinction between trade unions and public employee unions</p> <p>IV. Small group discussion</p>	
15 February 2021	President's Day holiday – No Class	
Session #4 22 Feb 2021	<p>Cost-benefit analysis and guarding the public purse</p> <p>I. Value for Money analysis</p> <p style="padding-left: 20px;">a. The public sector comparator</p> <p style="padding-left: 20px;">b. Life cycle costing</p> <p>II. Pricing of risk / Efficiency of risk transfer</p> <p style="padding-left: 20px;">a. The risk register and Monte Carlo analysis</p> <p style="padding-left: 40px;">1. Risk identification and quantification</p> <p>III. Principles of risk transfer in P3 contracting</p> <p style="padding-left: 20px;">a. U.S. case studies</p> <p>IV. The cost of deferred maintenance</p> <p style="padding-left: 20px;">a. Contracting structures that ensure timely maintenance of public assets</p>	Reading: Text, Chapter 7, <i>Allocation of Risk</i>

Session #5 24 Feb 2020	<p>The contractual structure of P3 transactions</p> <ul style="list-style-type: none"> I. The Contract Documents <ul style="list-style-type: none"> a. Commercial volumes <ul style="list-style-type: none"> 1. Term of agreement and hand-back requirements 2. Payment terms 3. Intellectual property escrow 4. Equity Commitments, equity transfer restrictions 5. Refinancing gain share 6. Insurance requirements b. Technical volumes <ul style="list-style-type: none"> 1. Scope of work 2. Mandatory design and construction standards 3. Performance specifications 4. O & M requirements c. Financing documents <ul style="list-style-type: none"> 1. Hedging agreement 2. Security documents 3. Inter-creditor agreement d. Key contracts 	Reading: Chapter 5, <i>The Contractual Structure</i> (p. 140-160)
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	<ol style="list-style-type: none"> 1. Design and construction contracts 2. Operations and maintenance contracts <p>II. Case Study presentations (Group 1)</p>	
<p>Session #6 01 Mar 2021</p>	<p>Management of public engineering works</p> <ol style="list-style-type: none"> I. The role of standards and guidelines II. Quality control and quality assurance III. Design submittal and peer review IV. Special geographic/geologic considerations: seismic, storm events V. Permits and inspections and Owner oversight Resiliency of Public Assets in an era of volatility VI. Construction claims and disputes <p>Case Study Presentation (Group 2)</p>	<p>Reading TBD Case study narratives due</p>
<p>Session #7 08 Mar 2021</p>	<p>Guest Lecture – Sam Hull, Plenary Group</p> <ol style="list-style-type: none"> I. Performance specifications <ol style="list-style-type: none"> a. Introduction b. Examples by design discipline c. Justification for use d. Responsibility for design, Spearling Doctrine 	<p>Reading TBD Essay assignment introduced</p>
<p>Session #8 15 Mar 2021</p>	<p>Design-Build and its Variations</p> <ol style="list-style-type: none"> I. Introduction II. Procurement structure <ol style="list-style-type: none"> a. Confidential outreach with Proposers b. Alternative technical concepts 	<p>Reading TBD</p>

	<ul style="list-style-type: none"> c. Approaches to aesthetic review <p>III. Financial structure</p> <ul style="list-style-type: none"> a. DBF, gap financing <p>IV. Commercial structure</p> <ul style="list-style-type: none"> a. Design period b. Construction period c. Performance specifications vs. prescriptive specifications <p>V. Operating period (DBOM)</p> <ul style="list-style-type: none"> a. Operating payment and deductions b. Capital maintenance c. Technology upgrades d. Handover <p>VI. Case Study and discussion</p>	
<p>Session #9 22 Mar 2021</p>	<p>Public-Private Partnerships – Revenue Risk Transactions</p> <ul style="list-style-type: none"> I. Introduction II. Procurement structure III. Financing structure <ul style="list-style-type: none"> a. Government subsidy b. Revenue back-stop; take or pay arrangements IV. Commercial structure <ul style="list-style-type: none"> a. Design period b. Construction period 	<p>Reading TBD Essay outlines due</p>

	<ol style="list-style-type: none"> 1. Performance specification and the Spearin doctrine 2. Non-compliance regime <p>c. Operating period</p> <ol style="list-style-type: none"> 1. Under-performing projects; revenue sharing for over-performing projects 2. Capital maintenance and renewal work reserves 3. Technology upgrades <ol style="list-style-type: none"> a. Handover <p>V. Case Study and discussion</p>	
<p>Session #10 29 March Apr 2021</p>	<p>Public-Private Partnerships – Availability Payment Transactions</p> <ol style="list-style-type: none"> I. Introduction II. Procurement structure III. Commercial structure <ol style="list-style-type: none"> a. Design period b. Construction period <ol style="list-style-type: none"> 1. Non-compliance regime; payment deduction for deficiencies in performance c. Operating period <ol style="list-style-type: none"> 1. Payment mechanism 2. Capital maintenance and renewal work reserves 	<p>Reading TBD</p>

	<ul style="list-style-type: none"> 3. Technology upgrades 4. Handover <p>IV. Case Study and discussion</p>	
<p>Session #11 05 Apr 2021</p>	<p>Public-Private Partnerships – Pre-Development Agreements and Real Estate Based Transaction</p> <ul style="list-style-type: none"> I. Introduction II. Procurement structure III. Commercial structure <ul style="list-style-type: none"> a. Lease vs. fee interest transfer b. Development sequencing <ul style="list-style-type: none"> 1. Leveraging development opportunities to pay for public works projects c. Design period d. Construction period <ul style="list-style-type: none"> 1. Non-compliance regime; payment deduction for deficiencies in performance e. Operating period <ul style="list-style-type: none"> 1. Payment mechanism 2. Capital maintenance and renewal work reserves 3. Technology upgrades 4. Handover 	<p>Reading TBD Essays due</p>

	IV. Case Study and discussion	
Session #12 12 Apr 2021	TBD	Reading TBD
Session #13 19 Apr 2021	Group Negotiation Project	
Session #14 26 Apr 2021	Course Review to prepare for final exam	
10 May 2021	Take Home Final Examination due	

VI. Statement on Academic Conduct and Support Systems

a. **Academic integrity:** Integrity and honesty are fundamental to the pursuit of truth and knowledge at any academic institution. These core values are essential to the function of the academic community at a research institution such as USC. Only by maintaining the highest standards of integrity are the conducting of research, the evaluation of students' academic performance, and the ultimate awarding of degrees meaningful and representative of reality. All students are expected to abide by the principles of academic honesty set forth in the Student Conduct Code

b. **Academic Conduct**

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

c. **Support Systems**

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention and Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED)- (213) 740-5086 | Title IX – (213) 821-8298

equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following *protected characteristics*: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations. The university also prohibits sexual assault, non-consensual sexual contact, sexual misconduct, intimate partner violence, stalking, malicious dissuasion, retaliation, and violation of interim measures.

Reporting Incidents Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report

Avenue to report incidents of harassment to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776

dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710

uscса.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.