JOHN A. REIF, JR. DEPARTMENT OF
CIVIL AND ENVIRONMENTAL ENGINEERING
NJIT New Jersey Institute of Technology

CE 495 – 142 Civil Engineering Design II, 3 Credits

Lectures: Saturday Hybrid 9:00 AM – 3:00 PM CKB Room 330

Instructor: Joseph Baladi, P.E., P.P., CME, CPWM

Email: joseph.baladi@njit.edu

Office Hours: Adjunct Instructor - In Class / By Appointment
In case there is a need for virtual meeting room:
https://njit-edu.zoom.us/j/5420885917?pwd=bGhETVl5MVlwVmg3b0RWTzkwTkZnZz09
Meeting ID: 542 088 5917
Passcode: 008474

Prerequisites: CE 333, CE 432, CE 443. Pre or Corequisite: CE 494.

Prerequisites: CE 210, CE 260, CE 320, CE 321, CE 350, CE 341, CE 341A, senior standing

Texts: No textbook. Handout materials only. Please see details in the course materials section.

Course Description:

Provides students with the type of design experience they would receive if engaged in civil and environmental engineering design practice including incorporating engineering standards and multiple constraints. Students can select from these design areas: structures, geotechnical engineering, transportation and planning, and sanitary and environmental engineering.

Course Objective:

By the end of the semester, students within the group should be able to work on a capital transportation design project through multiple towns, involving roadway improvement and bridge replacement, understand the mechanism of Capital Projects that are Federally funded, from selecting a candidate project to getting the project approved for design including Local Concept Development, Preliminary Engineering and Final Engineering in conjunction with complex requirements of NJDOT and NJTAPA procedures

Course Topics:

Topics learned depend on site selected. Typically the following topics are covered and progress work will be reviewed:

1. Introduction to project site, problem statemen and other constraints.
2. Procedures to approve capital projects selection and funding.

3. Local Concept Development Plans
4. Outreach to local community, stakeholders, local officials and the public.
5. Preliminary Engineering
6. Traffic analysis in the report and plan layout.
7. ROW acquisitions and procedures
8. Addressing utilities on site.
9. Final Design / Engineering drawing set.
10. Quantities and cost estimate.

POLICIES & PROCEDURES

Academic Integrity:
Academic Integrity: It is expected that NJIT's University Code on Academic Integrity will be followed in all matters related to this course. Refer to NJIT's Dean of Students website to become familiar with the Code on Academic Integrity and how to avoid Code violations.
https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Communication: Face to face in class otherwise email joseph.baladi@njit.edu

Lecture/Class: Students are required to attend all lectures. Class recordings are not permitted without instructor permission. Extended absence needs approval from the Dean's of Students Office

Handouts: Handouts will be posted on Canvas.

Homework and Final Exam / Grading: Students are expected to work on the assigned project and report from day one, and consult the instructor on their work process. Students are expected to visit the actual design site, and attend a Planning Board meeting, there will be final presentation, report and project submittal. The Grade will be based on the presentation and the review of the report and plans with 20 percent on presentation and report, and 80 percent on the engineering plans.

Grading 200 total points are assigned to the entire project.

Point Total	Grade
180 +	A
171-179	B +
160-170	B
151-159	C +
130-150	C
120-129	D
Below 120	F

Instructor Commitment: You can expect the instructor to be courteous, punctual, organized, and prepared for lecture and other class activities; to answer questions clearly; to be available during office hours or to notify you beforehand if office hours are moved; to provide a suitable guest

lecturer or pre-recorded lecture when they are traveling or unavailable; and to grade uniformly and consistently.

AI Statement: The use of artificial intelligence (AI) is permitted in this course only when explicitly stated in assignments. If students use AI for any course-related work, they must cite it according to the guidelines provided on the NJIT Library AI Citation page. If you have any questions about AI use in this course, please contact the course instructor before submitting any assignments. In cases where AI use is not allowed, students are expected to complete work without AI assistance to develop their skills in this subject area.

Students with Documented Disabilities: NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact the Coordinator of Student Disability Services located in the Center for Counseling and Psychological Services, in Campbell Hall, Room 205, (973) 596-3414. Further information on disability services related to the self-identification, documentation and accommodation processes can be found on the webpage at: (http://www.njit.edu/counseling/services/disabilities.php)

Course Schedule:
Please note for the Summer class, every two sessions will be combined in one, sequence may vary:

Meeting /Session	Lecture Topic
Session 1	Introduction to Capital Projects and procedures.
Session 2	Identifying problem statement and project specifics, location, history, use, overall significance, and value engineering.
Session 3	Actual technical attachments & reports associated with the project, survey files, geotechnical reports, environmental reports, stormwater issues associated with site, existing conditions that lead to problem statement.
Session 4	A to Z steps to select and approve funding of capital projects.
Session 5	Local Concept Development phase to analyze and select preferred Engineering alternative to a capital project that is under design.
Session 6	Considerations and approach to produce solution that is compatible with engineering standards, green design, ADA accessibility, and other considerations.
Session 7	Preliminary Engineering Phase: Utilize an actual field data, boring, survey and geotechnical report to choose preliminary design preferred corridor alignment
Session 8	Traffic analyses, HCS, assumptions, and level of service for the intersections in question
Session 9	Site visit.
Session 10	Attend an actual progress meeting with NJDOT / NJTPA for the project (date subject to modification)
Session 11	Final Design and ROW acquisition
Session 12	Complete engineering plans
Session 13	Review and comments on student progress plans. Option To present.

Session 14	Presentations & Discussions
Session 15	Course summary, closing comments and remarks, July 19, 2025

Outcomes Course Matrix – CE 495 142 Civil Engineering Design II

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Apply a simulated submission and acceptance process normally associated with the initial design phases for a civil engineering project. Prepare sketch plats, preliminary engineering design, and a related environmental assessment.			
Present an open ended civil engineering practice design problem for solution by teams of students.	1, 2, 7	1, 2	Final project report and periodic progress reports.
Discuss specific code, performance, cost, time, quality and safety objectives.	2, 4	1, 2	Final project report and periodic progress reports.
Work individually and within multi-disciplinary design teams.	1, 2, 5, 7	1, 2	Final project report, periodic progress reports, oral presentation of project.

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarships among our faculty and students
- to promote service to the engineering profession and society

Program Educational Objectives

Our **Program Educational Objectives** are reflected in the achievements of our recent alumni:

1. **Engineering Practice:** Alumni will successfully engage in the ethical practice of civil engineering within industry, government, and private practice, working towards safe, practical, resilient and sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.
2. **Professional Growth:** Alumni will advance their technical and interpersonal skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as academia, business, and law through further education.
3. **Service:** Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Student Outcomes

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusion
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Course Materials / References in Addition to Canvas:

A. Site base maps including boundary and topography data (CAD data).
B. Regulatory code as required.

1. NJ Stormwater Management Rules www.state.nj.us/dep/watershedmgt/rules.htm

2. Municipal bulk zoning table (CAD data).

3. NJDEP Stormwater Best Management Practices Manual and Rules www.njstormwater.org/bmp_manual2.htm

4. Design software and manuals for stormwater management and sanitary conveyance design.

5. NJDEP Nonstructural Stormwater Points System (NSPS) http://www.njstormwater.org/index.html

6. Supplementary materials for student review

7. MUTCD, MLUL, AASHTO and other State and Federal Manuals

8. Additional online data and mapping resources, i.e. Google Earth.

9. Textbooks from previous preparatory courses as well as other related references as required.

10. Reports and materials handed by Instructor

Course and Project Report Requirements

Project Plans: Utilizing the above mentioned material each team (5 student's max. per team).

Oral Presentation: For the final oral presentations, each team member will present their work to the class by discipline, i.e., transportation/planning, geotechnical, hydraulics/water resources, and environment. You are expected to dress and present yourself in a professional manner. Presentations shall be direct and comprehensive. Each team will be allotted 15 minutes to present their project to a mock planning board in an attempt to be granted approval by the board.

Computer Data and Computations: Students are required to use available computer applications for required computations in support of the information shown on the plans, profiles and in the reports. Several applications will be available at the NJIT computer facility and outside sources may be used.

Teams: The class will be divided into multiple teams. Each team will use a multidisciplinary approach. That means that each team member will assume a discipline-specific role on the project as follows: transportation engineer, planning engineer, geotechnical engineer, water resources engineer and environmental engineer.

Team Leader: You will also designate a team leader. The team leader is the project manager and shall coordinate and manage the project. The team leader will assign discipline-specific roles to team members. Teams are expected to take the project from preliminary design through to the final design report and oral presentation. This discipline-specific approach should not prevent one member of the team from helping out another member of the team. In fact, with four disciplines and three members to a team, all team members will collaborate on one of the four disciplines. Each student is responsible for the work in one discipline and must work with his/her team members on a second discipline.

Cost Estimate: You are to use the resources in the library, online or whatever resources are available and prepare a cost estimate of the public site improvements only (stormwater management system, roadway, etc. You are not to include the cost of developing the residential lots.

Reports: Reports shall include appendices that include **all** calculations for the storm water management system, traffic, and environmental assessments.

All calculations are to be initialed by the designer and the person who checked the calculations. Credit will not be given for unsigned calculations. All your reports are to be concise, well-thought-out and presented in a professional format.

Please remember there will be **no extensions granted** so use the semester time wisely. Many students underestimate the time required to learn the software, design, organize, publish and present the subdivision design. Students are asked to consider carefully the time required to learn the design process and all of the software required to publish this data. Make copies of your submission as the projects submitted will not be returned.

Minimum Requirements for Maps and Reports

Drawing Standards:

1. All existing and proposed property line print black with varying widths.
2. All existing features and contours print in shades of gray with varying widths.
3. All proposed conditions are to print bold black or in color with varying widths.
4. All printed plan labels shall be legible with the naked eye and shall be submitted in an ordered stapled set. The following shall appear on all maps.

Unit Precision and Format – All plans:

1. Contours, P=0.
2. Distances, P=0.01.
3. Elevations, P=0.01.
4. Radii, P=0.01.
5. Angles, DMS to one second (N 90d 45’ 33” E).
6. Stations, P=0 for centerline markers at 100’, P=0.01 for location.
7. Area, P=0 for square feet, P=0.001 for acres.
8. Volume, P=0 for cubic feet and cubic yards.

Content and Format

All reports shall be typed and presented as a professional report with a cover sheet, table of contents and letter of transmittal. The group number shall be included on the first page or cover of all documents.

Specific reference to all assigned regulatory code is required in all sections. This course will focus on the class assigned municipal/local bulk zoning code and New Jersey Administrative Codes, NJAC 5:21 (RSIS), NJAC 7:8 (The New Jersey Stormwater Management Rules) and the New Jersey Stormwater Best Management Practices Manual.

Reports shall document how the project design conforms to the code and defend any variance and/or waiver relief required. All groups must attempt to design without waiver or variance relief. Any request for design relief must be presented to the course instructor for preliminary approval at least two (2) weeks prior to the final submission date. No design relief will be granted after this date.

Honors Classes

In addition to Sections I through V above honors classes are required to:

1. Compose written legal descriptions for all proposed parcels and easements.

Final Submittal

A. Report
   1. Introduction: corridor description, towns, aerial, general location, history, and overall outlook for the area.
   2. Purpose and need statement.
   3. Capital projects, federally funded projects procedures.
   4. Existing conditions: Description and problem statement
   5. Proposal description: Number of lanes, roadway widening, circulation….
   6. Team strategy: Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
   7. HCS or other software analysis for existing and proposed traffic and lane configuration, LOS.

8. Cost estimate for your project.
9. Hydraulic summary.
10. References: List of all references you used: RSIS, AASHTO, MUTCD, reports,…

B. Plans*

1. Cover sheet: North arrow, keymap, address, scale, date, a place holder chart for properties owners within 200 ft (you do not to have actually list the individual owners for the sake of time limitation), utilities list, project name, block and lot. Quantity chart, and units (no pricing). List of all drawings in the set with page number.
2. Existing plan
3. Proposed corridor: Lane configuration, signage, ADA, elevation profile, access, traffic control devices, parking, road, mandatory road widening.
4. Construction drawings: Cross sections, longitudinal profile, quantity calculation, show all of the work that will be done in the field, include ADA Ramps.
5. Pavement plans:
6. Utility plans, drainage, relocation of utilities….
7. Signing and striping plans, ADA, crosswalks, stop bars, lane striping, arrows, paint quantities.
8. Detail Sheet: shows all details that are used, such as curb, manhole, inlets, plantations….

*Refer to sample Essex Street drawings in your package for more details indicated on each sheet.

One combined PDF file, named by the class – section - group individual Last name
CE495-SectionXXX_Brown Tom - Smith Eric - _____.pdf

PDF file includes your report, a set of plans, and presentation materials. USE PDF Pro to combine everything into ONE PDF document.

Instructions for printing to PDF

1. Set Name to DWG to PDF.pc3
    a. Properties
        i. Custom properties
            1. Additional output setting
                a. Uncheck “Include layer information”

The name of the project and the last name of each student and the engineering discipline should be on the cover of the report and plans.

Additional Notes:

1. Attendance will be taken at the beginning of the class and may affect your final grade.
2. In case of any student misses a class, or fail to submit assignment or presentation on time, the Office of the Dean of Students is the only entity that would determine the legitimacy of the absence or the situation via a written email addressed to the course instructor.
3. It is the student’s responsibility to contact the office mentioned above and make his/her case with proper documentations.
4. Students within the same group, may get different grade based on class & group participation.
5. The class will cover more materials than what is covered in the project submittal, it is advised to read the entire handout.

Presentation and plans due date: Saturday July 19, 2025