CROSSRAIL is an ambitious new east-west commuter railway beneath London whose centerpiece is a 21-kilometer tunnel and incorporates several new stations. A Bechtel-led team is overseeing construction of the tunnel and stations. Dubbed “Super Tube,” Crossrail will give some 1.5 million new riders easy access to the City of London, Canary Wharf, the West End, and Heathrow Airport. The 118-kilometer system is scheduled to open in 2018.

In addition to the twin-bore tunnel beneath densely-populated central London, Bechtel and team members Halcrow and Systra will be responsible for six new train stations. Rail projects in the UK are not new for Bechtel. In the late 1990s, the company helped complete the historic Channel Tunnel connecting England and France. In 1999, it completed the extension of London Underground’s Jubilee Line in time for the city’s millennium celebration. A Bechtel-led team managed construction of the High Speed 1 rail line between the Channel and London, and Bechtel managed the modernization of the busy West Coast Main Line.

Next to managing the vast, interwoven infrastructure projects, the project team’s biggest challenge is its tunnel work. Five separate, twin-bore drives are creating Crossrail’s 21-kilometer subterranean section under one of the Western World’s oldest cities, in ground honeycombed with networks of sewer lines, gas and water mains, building foundations, and other tunnels—including some London Underground tunnels dating to the early days of the world’s first subway, in the 1860s.

A convoy of at least seven giant tunnel-boring machines have round-the-clock crawled through the capital’s underground maze. The Crossrail team is employing a combination of ground-reinforcement techniques and extensive surveying to understand where remedial work might be needed. Major utility relocations are also taking place all over London to protect vital services for residents and businesses. There is also a long-term program in place to monitor more than 2,000 structures for up to two years after the job is completed to better understand the impact of major underground work on the surrounding infrastructure.

Keith Sibley BSCE ’72 MSCE ’73 is currently the Delivery Director—West on the London Crossrail project. Throughout a 40-year career with Bechtel in managing the construction and delivery of transformational Infrastructure, including Boston’s big dig, Keith attributes his interest in construction arising from a course he took jointly with architecture on constructability. Keith was recently recognized at the RPI TRB reception in Washington as a Distinguished Alumni of the Department for services to the Construction Industry.
New Courses in Construction

Due to RPI’s Civil Engineering heritage in construction: Erie Canal, American Railways, the Brooklyn and many other record breaking bridges, the Department is seeking to better equip students with exposure to this important area of Civil Engineering. Apart from annual site visits to the GW Bridge in NYC, new courses are being developed and offered with a focus on construction that join traditional Construction Management courses. Funding is being generously provided by a number of sources, including alumnus Bill Herkenham and his wife Elizabeth.

Masonry Design and Timber Design

are new material design courses for students that exposes them to old but still very relevant materials and design practices in construction and retrofitting. These courses are offered in alternate fall semesters and the Masonry Society generously assisted in funding the Masonry course and assisted with students undertaking practical working in laying masonry at a nearby site. The Timber Design course will be taught by Timber Bridge Specialist Phil Pierce from CHA, responsible for an ASCE Manual on the topic.

Design for Constructability is an intriguing and informative class that covers all aspects of temporary engineering during construction as well as ensuring a clear process for constructability of a design. Much too often, construction incidents occur due to a lack of knowledge and engineering on site. Design for Constructability covers the temporary structures and engineering processes that can be employed by contractor and engineer to prevent these construction disasters. Topics considered include construction business processes, building codes, construction and environmental loading, bracing/guying, concrete form work, scaffolding and shoring, crane selection, foundation design and repair, cofferdam design, and more. Safety is also a major concern in the construction industry. This course allows students to explore the history of construction engineering disasters and learn how the mistakes made could have been prevented. A final project allowed students to display their full knowledge of the construction process and temporary structures as they are required to calculate and design all aspects of a local construction project.

A Special Thank You to Dr Michael J. Casey

Dr Casey taught our inaugural Constructability course in Spring 2014, largely from an electric wheelchair due to a debilitating illness. His class prepared this tribute:

“A gifted teacher of engineering principles and practice who also provided worldly guidance about the challenges of our future; a special person who shared his passion and wisdom; a proud man willing to share not only his knowledge but also his heart. From a thankful group of students who will be guided by his teachings for a lifetime.”
Rear Adm. Lewis B. Combs, CE '16, co-founder of the U.S. Navy Construction Battalions (Seabees) was inducted into Rensselaer’s Alumni Hall of Fame last fall. Lewis Barton Combs was born on April 7th, 1895 in Manchester Center, VT. Rear Adm. Combs’ family moved to Rensselaer, NY in 1907 and he would later go on to college at RPI, graduating with the class of 1916 with his bachelor’s degree in Civil Engineering. He had a military career spanning two world wars, touching the lives and careers of many servicemen and women both in service and academia and because of his influence Combs was given the unofficial title of “uncle of the Seabees”.

Soon after graduating he began an engineering career working for the New York Central Railroad. Wanting to serve his country he joined the U.S. Navy and received an appointment with the rank of lieutenant (junior grade) in December 1917. Between 1919 and 1924 he served in the Republic of Haiti, where he was in charge of the Highways and Bridges as well as Harbor Development and Lighthouse Service. It was during this time that he received his appointment of permanent rank status of lieutenant.

In 1937 Combs served as the assistant chief of the Bureau of Yards and Docks (BuDocks). It was this military assignment that Combs began his ties to the Civil Engineer Corps (CEC). A year later under the appointment of President Roosevelt, Adm. Combs and Adm. Morrell would head up the BuDocks. Combs began planning for the coming conflict which was certain to engage the Navy around the globe. Just after Pearl Harbor, the Seabees were born. Combs would travel more than 100,000 miles to meet with Seabees during WW II. His dedication, training and guidance were invaluable. Today the CEC is located in Port Hueneme, California.

After his military career Coombs returned to RPI and in 1948 was appointed Department Head of the Civil Engineering program. He would oversee the program for the next 13 years, graduating as many as 395 Naval Officers.

In 1996 Adm. Lewis B Combs passed away aged 101 years. He was the oldest CEC Officer in the USN history, touching more civil engineers than any other in the history of the Navy. Now 18 years after his passing, Adm. Combs has been inducted into the Alumni Hall of Fame at RPI and the U.S. Navy Museum at Port Hueneme, CA opened a new exhibit, “The Century of Before Seabees: The Bureau of Yards and Docks, 1842-1942”, which features a display about Adm. Combs and RPI’s long and rich association with this branch of the US Navy.
Lenny Lustrino MEng ‘12 is currently working on the New NY Bridge (Tappan Zee Hudson River Crossing) project as a Deputy Area Manager for HDR. The New NY Bridge will replace the existing Tappan Zee Bridge crossing which handles more than 138,000 vehicles every day—far more than its design capacity.

The new parallel bridges are over 3 miles long and will cross the Hudson River at one of its widest points to connect Rockland and Westchester counties. Key features of the new bridge include twin iconic cable-stayed main spans with 1,200-foot center spans. Each bridge carries four general traffic lanes plus shoulders and extra-wide emergency lanes. The bridge will have new temporary tolling facilities with AETC (All Electronic Toll Collection) and a shared-use path (dedicated bicycle and pedestrian) on the northern bridge with scenic overlooks. The project implements Intelligent Traffic Systems (ITS) and Advance Traffic Management Systems (ATMS) to improve the flow of vehicle traffic. The crossing is designed for a 100-year service life and will be mass-transit ready for bus rapid transit without strengthening, or for commuter or light rail on a separate structure constructed between the two highway bridges. The project team will follow strict environmental performance commitments to protect the Hudson River estuary.

The New York State Thruway Authority selected design-build as the delivery method for this project to meet an aggressive schedule. HDR is the lead designer, and a subcontractor for Tappan Zee Constructors LLC, a consortium of Fluor Enterprises, American Bridge Company, Granite Construction Northeast, and Traylor Bros. Detailed design includes deep foundations, cable-stayed main span and girder/sub-stringer approach span structures, pre-cast substructure and superstructure components and highway design including alignments, AETC tolling, ITS, utilities and facility design. HDR is also leading significant environmental compliance activities including underwater noise, water quality and airborne air/noise monitoring.

Rensselaer Polytechnic Institute has ties with the existing Tappan Zee as well as the New NY Bridge. The innovative floating caissons of the existing bridge were the design of Rensselaer Alumni Hall of Fame member Emil Praeger. Emil used the buoyancy of large empty concrete caissons to counteract a large portion of the dead load of the existing bridge structure. Lenny Lustrino graduated from RPI in December 2012 with a B.S./M.E. in Civil Engineering and immediately began working for HDR as a Deputy Area Manager for main span, service life and miscellaneous structures design deliverables on HDR’s design production team. HDR created this team to ensure that the extensive number of design deliverables were submitted on time and in compliance with the project’s strict quality control policies. It is both exciting and rewarding to know that RPI still has strong ties with this historic mega project right down the river from Rensselaer itself.

Mary Ciufo BSCE ‘13 was asked if she could briefly tell us about one of the most interesting things she has done since graduating and commencing work with CBI.

“I would say the most interesting thing I have done in the workplace is being out on the job site. I am currently spending about half of my time in an office and half of my time out in the field, working with subcontractors on the foundations for the project I’m working on. I’ve learned that it’s one thing to be able to design a foundation in an office, but it’s a completely different story to make something that can be constructed easily. There is never one correct answer to a design. For example, there are 3 different types of piles being used at the job site I am on, and I’ve seen the pros and cons of each. One type of pile we’ve used is slightly cheaper because it provides more strength, and thus we use less piles. However, this pile takes much longer to install so it could prolong the schedule of the project. Another type of pile is more expensive but is very easy to install. The third type of pile is required because of the soil conditions on some parts of our site. I’ve also realized that you need to have knowledge in all areas of design in order to create a good product - you need to understand the geotechnical, environmental, and structural impacts before putting together a design. I really feel that every engineer should have field experience to see the implications of what they are designing.”