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Bridge & Structures Office Excellence & Innovation in Design



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Bridge Design

The WSDOT Bridge and Structures Office provides safe structures for the state's transportation system. There are 3,100 vehicular bridges on State highways that keeps Washington moving. WSDOT is nationally known for its high level structural technical expertise. Our engineers are trained to design steel and concrete bridges in highly complex and challenging projects.

The office has one of the highest concentrations of registered 'structural engineers' in the United States. Structural engineers study for many years, undergo rigorous national testing and are the most elite group in the bridge design field. We also have PhD engineers that guide the office in national and international research activities.

We have nearly a century of expertise in these services:

- Preliminary Plans
- Contract Documents
- Construction Specifications and Cost Estimate Preparation
- Construction Support
- Bridge Architecture
- Signs and Illumination Structures
- Retaining Walls

- Special Structures: Floating Bridges and Moveable Bridges
- Bridge Repairs
- Type Size and Location Reports
- Value Engineering
- Emergency Design

Preliminary Plan Preparation

The office prepares bridge preliminary plans defining the bridge type and orientation. Preliminary design engineers lead the process that establishes the structure type, depth and span arrangement. This collaboration with stakeholders is the basis for completing the final design.

Contract Documents

Bridge designers and detailers use state of the art computer software in their engineering computations.

Structural experts work with the specifications and cost experts to provide contract documents for construction. This activity consumes most of the time and staff for a typical bridge project.

The office has many decades of experience and institutional knowledge to draw upon.

Construction Specifications and Cost Estimate Preparation

Preparation of the construction specifications involves identifying work items and details that are not covered by the WSDOT Standard Specifications for Road, Bridge and Municipal Construction, and assembling pertinent special provisions to supplement the specifications for work items and details. Structure cost estimates are prepared based on the quantities calculated for each bid item of structure work, and a review of how this project fits into the current heavy construction economic work climate.



Fish Passage on USFS land.

Americans with Disabilities Act (ADA) Information: This material can be made available in an alternate format by emailing the WSDOT Diversity/ADA Affairs team at wsdotada@wsdot.wa.gov or by calling toll free, 855-362-4ADA (4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711.

Title VI Statement to Public: It is the Washington State Department of Transportation's (WSDOT) policy to assure that no person shall, on the grounds of race, color, national origin or sex, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against under any of its federally funded programs and activities. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equal Opportunity (OEO). For additional information regarding Title VI complaint procedures and/or information regarding our non-discrimination obligations, please contact OEO's Title VI Coordinator Jonte' Robinson at (360) 705-7082.

Construction Support

Bridge construction staff review and approve construction working documents. Construction support is highly specialized. Engineers perform independent structural review and analysis of falsework, structural shoring, cofferdams, girder erection and assembly plans, and demolition procedures. This is one of the most important project phases for both the safety of the traveling public and construction workers.

Bridge Architecture

Consistent with all world class engineering enterprises, we have a full time staff architect with assistant. The architect assures designs fit sensitively into their settings by working with community groups. They are members of the American Institute of Architects and employ best practice in Context Sensitive Design (CSS) and Crime Prevention Through Environmental Design (CPTED).

Signs and Illumination Structures

We design and review all overhead signing, signal and illumination structures in the state highway system. These structures provide design challenges for our staff, requiring innovative approaches to overcome existing constraint in previously developed urban corridors.

Retaining Walls

The office designs large lateral support structures of all types. Standard designs for reinforced concrete cantilever wall, noise barrier walls and geo-synthetic walls are used all over the state.

We also establish design and performance criteria for structural earth wall (SE) systems. 'Pre-approved' designs undergo rigorous assessment to ensure public safety.

Special Structures: Floating Bridges and Moveable Bridges

Washington State is the floating bridge capital of the world. The original Lake Washington floating bridge opened in 1940 and was followed by three others. These four bridges are the longest of any in existence. Engineers from Canada, Norway, Japan and other countries travel to Washington to study these feats of engineering.

Type Size and Location Reports

The Federal Highway Administration (FHWA) requires that major or unusual bridges must have a Type, Size, and Location report prepared. The reports describe the project, proposed structure, cost estimates, design

alternatives, and recommendations. We produce these documents through an interdisciplinary team.

Value Engineering

Value Engineering (VE) is a review process and analysis of a design project. Bridge engineers work in intensive three to five day sessions with other experts. They evaluate alternatives for effectiveness, determine costs, and prioritize and recommend designs.

Emergency Bridge Repairs and Design

The office is routinely involved in emergency bridge repairs and construction. Over height vehicle impacts, fire damage, errant freight truck damage, scour damage and earthquakes all pose risks to the state bridge inventory.

Bridge Innovation and Research

Bridge Design office engineers are active in the national engineering arena. The following is a partial list of committees our staff have a leadership role in.

AASHTO

- Concrete T-10
- Research T-11
- Moveable Bridges T-8
- Tunnels T-20

TRB

- Bridge Aesthetics Subcommittee
- Accelerated Bridge Construction AFF10-3
- Concrete Bridges AFF30
- Seismic Design AFF50
- Emerging Technology AFN10

Accelerated Bridge Construction

- Contributing members

Domestic Scan on Tunnel Design

- Contributing member

NCHRP

- Countless research projects extending over many decades.

ACEC/WSDOT Joint Structures Team

- Co-Chair and multiple memberships

PCI & Northwest PCI/WSDOT Joint Committee

- Integration of industry and government in efficient cost effective design
- PCI Concrete Bridge Committee
- PCI Seismic Design Subcommittee: Chair

ASBI

- Board and Technical Committee Member

ADSC/WSDOT Team

- Collaboration with drilling industry and design for the public good

AGC/WSDOT Team

- Continuous meetings with local representative of one of the nation's most important construction contractor organizations

Bridge Awards

- T.Y. Lin Award, ASCE – March 2014,
- Charles C. Zollman Award, PCI Journal 2013,
- Charles C. Zollman Award, PCI Journal 2011,
- Martin P. Korn Award,
- PCI JOURNAL Award 2005,
- T.Y. Lin Award, ASCE – SEI May 2006

Published Articles

The WSDOT Bridge Office has published hundreds of articles over the years Staff engineers are on numerous industry and public sector committees. Their writings are published all over the United States and the world.

Mega Projects

- SR 99 Alaskan Way Viaduct and Seawall Replacement
- US 395 North Spokane Corridor
- SR 520 Floating Bridge Replacement
- I-5 Columbia River Crossing

Local Agencies and State Agencies Collaborations

- Department of Natural Resources
- Washington State Ferries
- United States Forest Service

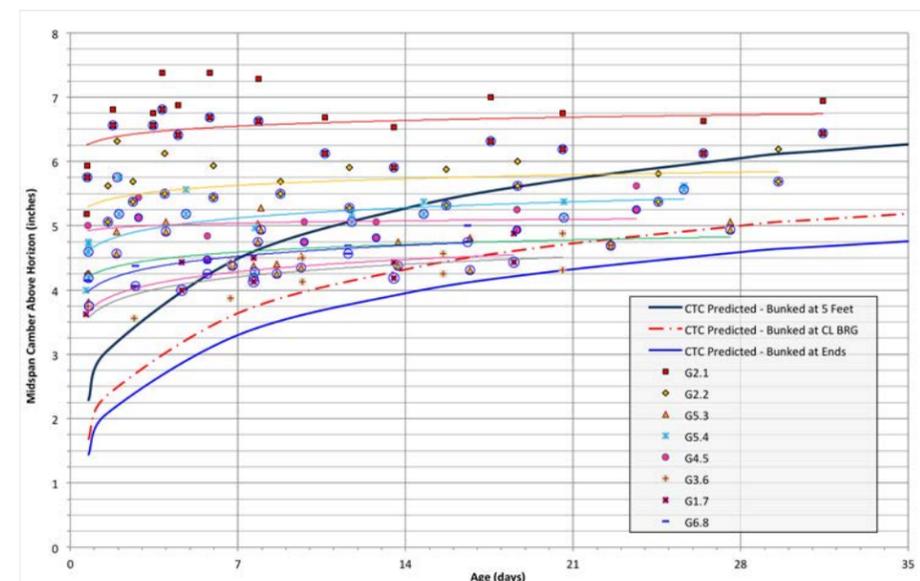


Figure: Research Graph



Canyon Park