

Quality and Productivity Commission
30th Annual Productivity and Quality Awards Program
“Heritage of Excellence”

2016 APPLICATION

Title of Project (Limited to 50 characters, including spaces, using Arial 12 point font):

NAME OF PROJECT: BRIDGE CAPACITY SYSTEM

DATE OF IMPLEMENTATION/ADOPTION: JULY 2011
(Must have been implemented at least one year - on or before July 1, 2015)

PROJECT STATUS: Ongoing One-time only

HAS YOUR DEPARTMENT PREVIOUSLY SUBMITTED THIS PROJECT? Yes No

EXECUTIVE SUMMARY: Describe the project in 15 lines or less using Arial 12 point font.

1 In 2011, in collaboration with the California Department of Transportation (Caltrans) and
2 the Federal Highway Administration (FHWA), the County of Los Angeles Department of
3 Public Works (Public Works) assumed a leadership role in developing the Bridge
4 Capacity System (BCS). The BCS is user-friendly software available for all regulatory
5 agencies within the State of California to process Oversize or Overweight
6 Transportation (OOT) permits. Many local agencies do not have the technical ability to
7 review overweight vehicle impact on bridges and issue OOT permits, thus resulting in
8 high-risk and accelerated degradation of local bridges. Caltrans, FHWA, and
9 Public Works recognized a large-scale unmet need for a streamlined review process
10 through a web-based system allowing local regulatory agencies to comply with OOT
11 Permit requirements. Public Works developed a pilot web-based software that verifies
12 inputted weight of permit vehicles against the load carrying capacity of all bridges on a
13 route. Once complete, the system will include bridges throughout 58 counties and 482
14 municipalities within the State of California to be used by all permit-issuing local
15 agencies to monitor degradation from overweight vehicles and program appropriate
mitigation and funding needs.

BENEFITS TO THE COUNTY

(1) ACTUAL/ESTIMATED ANNUAL COST AVOIDANCE	(2) ACTUAL/ESTIMATED ANNUAL COST SAVINGS	(3) ACTUAL/ESTIMATED ANNUAL REVENUE	(1) + (2) + (3) = TOTAL ANNUAL ACTUAL/ESTIMATED BENEFIT	SERVICE ENHANCEMENT PROJECT
\$4,000,000	\$36,000	\$	4,036,000	<input checked="" type="checkbox"/>

ANNUAL = 12 MONTHS ONLY

SUBMITTING DEPARTMENT NAME AND COMPLETE ADDRESS County of Los Angeles Department of Public Works 900 South Fremont Ave., Design Division, 6 th Floor Alhambra, CA 91803		TELEPHONE NUMBER 626-458-7829
PROGRAM MANAGER'S NAME Raymond Lui		TELEPHONE NUMBER 626-458-7990 EMAIL rlui@dpw.lacounty.gov
PRODUCTIVITY MANAGER'S NAME AND SIGNATURE <small>(PLEASE CALL (213) 893-0322 IF YOU DO NOT KNOW YOUR PRODUCTIVITY MANAGER'S NAME)</small> Kimberly Y. Lyman SIGNATURE ON FILE	DATE	TELEPHONE NUMBER 626-458-5975 EMAIL klyman@dpw.lacounty.gov
DEPARTMENT HEAD'S NAME AND SIGNATURE Gail Farber SIGNATURE ON FILE	DATE	TELEPHONE NUMBER (626) 458-4002

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1st FACT SHEET – LIMITED TO 3 PAGES ONLY: Describe the **Challenge, Solution, and Benefits** of the project. State clearly and concisely what difference the project has made. Use Arial 12 point font

Challenge

Within the State of California, an Oversize or Overweight Transportation (OOT) Permit is required for the movement of vehicles and loads exceeding statutory size and weight limitations specified in the California Vehicle Code. The relationship between bridge capacity and vehicular weight is not as intuitive as people commonly believe. The tonnage limit signs that drivers may see posted at bridge approaches do not tell the full story. The distribution of weight along the wheel axles and the spacing of the axles offer a more complete picture. A significant amount of engineering knowledge and analysis is required to properly determine if an oversize or overweight vehicle should be allowed to pass over a bridge because of variations in size, weight, and axle spacing. Limited resources to conduct an extensive analysis and the time constraints to provide a permit has lead local agencies to inconsistently process OOT Permits and sometimes without the review of a bridge engineer. As a result, there is a risk and potential for accelerated degradation of local bridges throughout the State of California due to overweight vehicles.

Prior to implementing the BCS, Public Works' Structures Section required the bridge analysis to be conducted by an experienced bridge engineer when an overweight permit exceeded a total weight of 250 kips. The 250 kips truck was selected because it is considered an extremely heavy load and served as a threshold for further engineering analysis. During the analysis, an engineer would visually identify a wheel axle group that should produce the maximum loads and check that value against the flow charts per the Caltrans' Permits Review Manual. Each bridge had to be manually located on the Thomas Guide map, and the load rating record of each bridge had to be retrieved and compared to the Caltrans chart. This review process was very tedious, and required many engineering hours to complete one review. In addition, it can be extremely overwhelming if local agencies do not have bridge engineering staff or employees that have a sufficient bridge engineering background.

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Solution

To minimize that risk, Caltrans and the FHWA approached Public Works in 2011 to develop the Bridge Capacity System (BCS) simple and user-friendly software that can be provided to all regulatory agencies within the State of California to aid in the processing of OOT Permits. The objective was to develop a software that must be able to calculate and check the inputted weight of a permit vehicle against the load carrying capacity of all the bridges on a requested route. The BCS has completed several phases of implementation and is currently used by Public Works' Structures Section. Eventually, the BCS program will include all local bridges in the State of California and the program will be available for all cities and counties to use as a tool for processing OOT Permits.

The three major components that make up the BCS program are the bridge data input to a GIS map, comparing permit truck loading with bridge load rating capacity, and creating a routing system that identifies all bridges on the route. Phase by phase, the BCS has gained momentum and proven to be a feasible solution. As the BCS expands to include the entire State of California, the increased scope will lead to a fully developed software.

The Bridge Capacity System utilized the following industry standard technologies:

- ESRI ArcGIS – To develop bridge data
- Google Maps – For truck routing purposes
- Microsoft ASP .Net – Develop algorithm for Caltrans Standards and Formulas
- Oracle 11g Database – Store truck, bridge, and route data

Results

Currently, the BCS is used by Public Works' Structures Section to aid in the permitting process of approximately 40 overload permits per year that exceed the 250 kips weight limit. The BCS is very intuitive and easy to use. It allows for entry level engineers to run an accurate analysis. The BCS has the functions to indicate whether the permit truck would exceed the bridge capacity, and to check whether the truck height would exceed the bridge clearance preventing a collision with the superstructure. As a result of using the BCS, several truck haul permits were re-routed to avoid potential damage to bridges. In addition to the technical aspect of the project, the BCS also demonstrates the intergovernmental cooperation and coordination by promoting partnership among Caltrans, FHWA and Public Works. This partnership provides an innovative and efficient solution to extend the longevity of our current infrastructure.

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LINKAGE TO THE COUNTY STRATEGIC PLAN (DETAIL IS REQUIRED FOR COUNTY DEPARTMENTS): Use Arial 12 point font

County Strategic Plan

The Bridge Capacity System is an excellent candidate for the Productivity and Quality Awards Program because the BCS aligns with many of the initiatives highlighted in the Los Angeles County Strategic Plan. The program falls under the categories of Targeted Risk Management, Innovative Technology Application and Customer Service Innovation/Enhancement. Targeted Risk Management is addressed by taking preventative measures to avoid potential damage to existing bridges prior to the truck load transport. Bridges are vital assets and infrastructure to the County of Los Angeles and if usage is not carefully managed, the lifespan of the bridge could be dramatically shortened or worst, instant collapse. With the BCS we can scientifically evaluate each vehicle’s impact on our bridges, thus protecting and prolonging its service life.

The BCS is an innovative application of GIS technology and computer software to simplify a complex and extensive engineering analysis into a user-friendly software. The program automates a significant portion of review work, and enhances customer service by greatly reducing the review time to provide the public a speedy permit review turnaround. The data collected from BCS can potentially allow us to have a comprehensive understanding of how our roadway system is used by the trucking industry. In the future, the data collected will allow us to implement better traffic design, and planning for infrastructure upgrade projects.

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COST AVOIDANCE, COST SAVINGS, AND REVENUE GENERATED (ESTIMATED BENEFITS TO THE COUNTY): If you are claiming cost benefits, include a calculation on this page. You must include an explanation of the County cost savings, cost avoidance or new revenue that matches the numbers in the box. Remember to keep your supporting documentation. Use Arial 12 point font

Cost Avoidance: Costs that are eliminated or not incurred as a result of program outcomes.

Cost Savings: A reduction or lessening of expenditures as a result of program outcomes.

Revenue: Increases in existing revenue streams or new revenue sources to the County as a result of program outcomes.

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\$ 4,000,000	\$36,000	\$	\$ 4,0360,000	<input checked="" type="checkbox"/>

ANNUAL= 12 MONTHS ONLY

Once the BCS is rolled out to other municipalities, it will allow staff with minimal engineering experience to conduct a highly technical review very quickly and efficiently. Engineering staff will no longer be required to perform a tedious manual review, and all truck routes can be analyzed. Therefore, the number of work hours to process and provide accurate reports will be significantly reduced. For Public Works, the reduction of hours has provided a labor cost savings of approximately \$36,000 annually. In addition to increasing productivity and work flow, the program will continue to provide proactive measures to reduce the probability of over usage and damage to our existing bridges. Therefore, assuming that each bridge is protected by this review system, the savings on each bridge would be its replacement cost. The average bridge replacement is about \$4,000,000.