



# N.C. Department of Transportation Continuous Process Improvement Results & Award Form

## Category (Check One Only)

- |                          |                              |                          |                           |
|--------------------------|------------------------------|--------------------------|---------------------------|
| <input type="checkbox"/> | Dollar Savings               | <input type="checkbox"/> | Internal Customer Service |
| X                        | Cycle Time Reduction         | <input type="checkbox"/> | External Customer Service |
| <input type="checkbox"/> | Internal Communications      | <input type="checkbox"/> | Safety Improvement        |
| <input type="checkbox"/> | External Communications      | <input type="checkbox"/> | Labor Hour Savings        |
| <input type="checkbox"/> | Environmental Sustainability |                          |                           |

Submission (Check One Only)    X    Award Application        Results Book Only  
(Do not complete questions 1-4)

### Person or Team Being Nominated:

Team Name    POWERLIFTERS                      Team Leader    L. L. UPOLE, JR.  
 Team Members    L. L. UPOLE, JR. AND QUINDALE BULLARD  
 Facilitator(s)    RENEE ROACH                      Team Sponsor    KEN MURPHY  
 Process Owner    DIVISION 6 BRIDGE MAINTENANCE UNIT

Organization Name:    NCDOT-DIVISION 6 BRIDGE MAINTENANCE UNIT

Name of the Project:    VARIABLE REACH FORKLIFTS

Provide a brief description of the problem, action taken to solve it and results of your action. This description is not considered in scoring but will appear in the Results Book. (300 words)

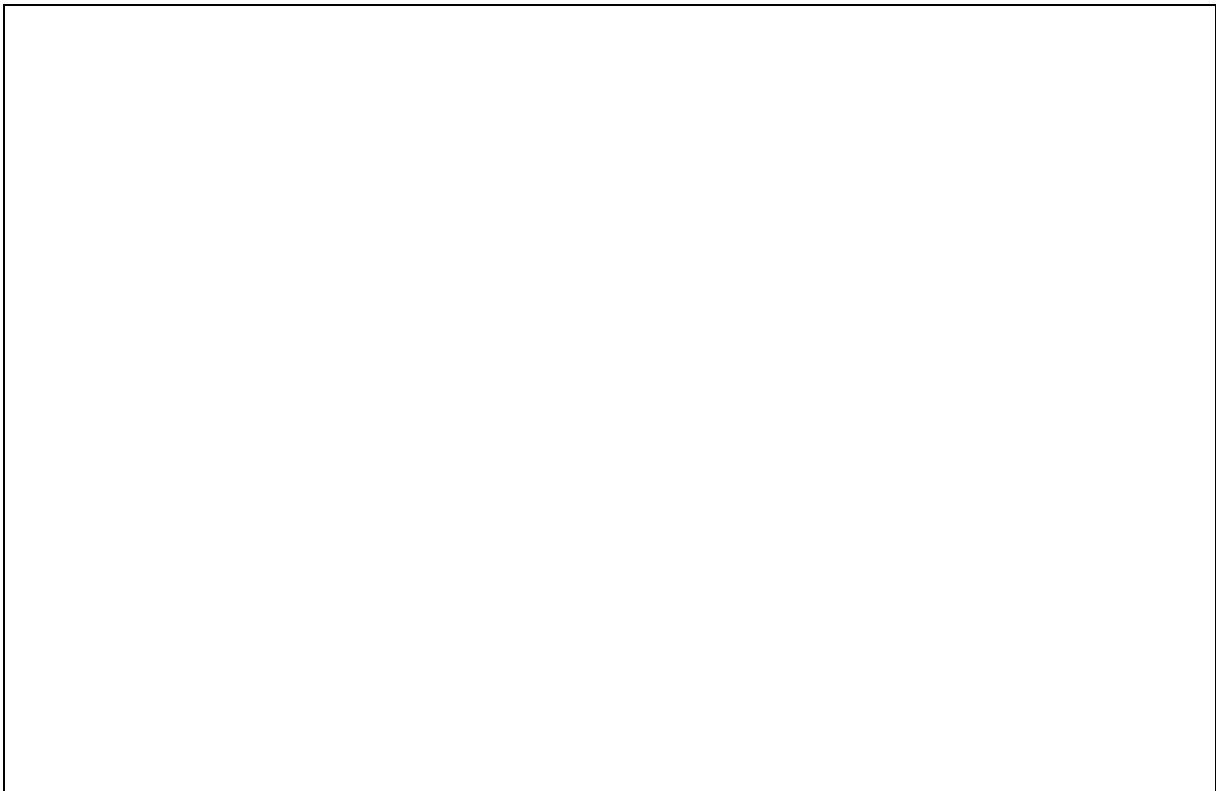
The Bridge Maintenance Unit was interested in reducing the cycle time required to replace severely damaged bridge girders/beams that had been struck by over height loads. Often girders that are struck by over height loads can be repaired in place, but there are occasions when the damage to the girder is too severe to repair and the girder must be replaced quickly, safely, and efficiently.

In the past, the normal procedure to replace a girder involved constructing heavy timber shoring and scaffolding, utilizing 12"x12" timbers and extensive cross-bracing. After raising a section of the affected span utilizing a jacking beam, cutting the bearings and diaphragms, the old beam is slid out onto the shoring with jacks to a point outside the floor slab where it can be removed by a crane. The new beam is then installed in a reverse manner.

The team reviewed numerous methods and determined that variable reach forklifts allowed the removal and replacement of a damaged girder in less time. Extensive shoring and scaffolding is not required during the "change out", and the safety aspect of the job has greatly improved.

Changing methods of girder replacement has resulted in an average reduction in the repair time from 10 days to 4 days. The labor hour saving equates to \$ 15,913.41 per bridge. The inconvenience to the traveling public and local businesses, with detours and delays, has been reduced by 6 days. Traffic Engineering has estimated that this constitutes savings of \$ 290,643.21 per bridge.

Utilizing this method to-date, the Bridge Maintenance Unit has repaired two bridges with estimated savings to the Department of \$ 613,113.24.



*To check eligibility for the State Employee Incentive Bonus Program, contact the DOT Bonus Program Coordinator at (919) 733-7686.*

#### **Criteria**

- 1- What are the tangible, intangible and verifiable results or impact of the project? Applicant should compare before and after data. In projects without data, evidence should indicate a verifiable improvement in quality. [50 points]**

The major impacts utilizing these forklifts are three-fold: (1) Time Savings (2) Labor Savings, (3) Overall safety improvement. A beam replacement project that would normally take 10 working days to complete now averages 4 working days, resulting in an average of 6 days savings per repair. This cycle time reduction also directly relates to labor savings. In addition, the overall safety of the procedure is improved by laborers now being located outside the "Danger Zone". Previously, laborers were on top of the same scaffolding and shoring that the old and new beams rested on during removal and installation. Currently, with the use of the variable reach forklifts, no shoring is required and portable scissors lifts are moved into place, only after the beam is in position to secure.

Another major benefit is the increase in safety to the Traveling Public. This is accomplished by reducing lane closures on Interstate Routes by 6 days each occurrence. The Department significantly reduces the possibility of rear end collisions in the lane closures, which result in property damage, injury and even death.

The financial savings utilizing this method of girder replacement are two-fold. The Traffic Engineering Section with their "Quewz" program calculated the first. This program calculates user costs induced by detours and delays to normal traffic patterns. "Quewz" takes into account the type of highways affected, normal speeds, level of service, speed at capacity, lane closures, time of day, percent of truck traffic, taper and work zone lengths, and lane capacities. Also with "Quewz", Traffic Engineering is able to predict the user costs for each day that a highway or a lane, on a multi lane highway is closed or detoured. Printouts of estimated user cost savings are located in section V & VI of this submittal. The total estimated savings, as it pertains to traffic delays and detours on the two mentioned projects, was \$ 581,286.42.

1) Bridge Number 66-I-95 cost \$ 75,650./day (delay) x 6 days = \$ 453,900.00

SR-1793 over I-95 (detour)-\$ 13,250./day x 6 days = \$ 79,500.00  
 2) Bridge Number 77 I-95 cost (one lane closed) \$ 7,295.07/day x 6 days = \$ 43,770.42  
 US421 (one lane/both directions) \$ 686.00/day x 6days = \$ 4,116.00

**TOTAL USER COST SAVINGS DUE TO THE REDUCTION OF DETOURS  
 AND DELAYS BY AN AVERAGE OF 6 DAYS = \$ 581,286.42**

**TOTAL LABOR HOUR & EQUIPMENT SAVINGS = \$ 31,826.82**

**TOTAL SAVINGS TO NCDOT (2001 JAN THRU JUN) = \$ 613,113.24**

2- What is the size of affected population, or potential population if the project is implemented among its widest possible audience? [10 points]

Delays and detours, along the I-95 corridor, affect the entire eastern seaboard. Tourists, emergency vehicles, law enforcement officers, school buses, mail carriers, transporters of perishable products, medicines, fuel suppliers, as well as hazardous materials travel daily along this corridor. In addition, local traffic and travel businesses, which rely heavily upon this highway, carried by the bridge structures, are inconvenienced and delayed. During beam replacement, no traffic is able to cross the structure.

3- Explain how the project could serve as a model for others to follow. Include the innovation, difficulty of implementation and documentation of results. [20 points]

The Fayetteville Bridge Unit has replaced exterior beams on two (2) bridges to date using variable reach forklifts. These rental units are available from numerous vendors and are easy to operate; therefore, the majority of the Bridge Units could easily implement this project. The photos attached are the best documentation to exemplify the results.

4- Explain the process of implementation and provide documentation. [20 points]

Mr. Dale Bullard had members of the Fayetteville Bridge Crew test these forklifts in the bridge yard prior to using them on the first project. The forklifts are tested for strength (lifting), extension, turning radius, and ease of operation. One of the best features of these forklifts is their ability to “lean” left or right with the use of hydraulic cylinders. This feature allows small adjustments or “shifting” of the beam once it is in close proximity of its correct position. Bridge # 66 in Harnett County (SR-1793, Pope Road over I-95), and Bridge # 77 in Harnett County (I-95 over US421) have been repaired using variable reach forklifts with great success. These sites are documented and are included as part of this submittal.

<b>Contact Person</b>	<b>L. L. Upole, Jr.</b>	<b>Date Submitted</b>	<b>05/19/01</b>
	(if different from team leader)		(No later than July 31)
<b>Mailing Address</b>	P. O. BOX 1150 Fayetteville, North Carolina 28302		
<b>E-mail Address</b>	<b>Lupole@dot.state.nc.us</b>		
<b>Immediate Supervisor</b>	<b>Ken Murphy</b>	<b>Phone #</b>	910-829-6345

(Supervisor must approve application.)

**E-mail** to [CPI@dot.state.nc.us](mailto:CPI@dot.state.nc.us), **mail** disk to Productivity Services, Transportation Building, Raleigh, or **fax** to (919) 715-2533.

(Revised 2/2000)