HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF, INC.
ARCHITECTS ENGINEERS PLANNERS

600 108th Avenue, N.E.
Suite 405
Bellevue, Washington
98004
(206) 455-3555
FAX (206) 453-9179

May 22, 1995

Don Peterson, P.E.
Pierce County Public Works
Road Department
2401 South 35th Street
Tacoma, WA 98409

16619

Dear Mr. Peterson:

I am pleased to submit to you the enclosed report documenting and summarizing our completed load rating of the Fox Island Bridge. This latest load rating used the results of the concrete compressive strength tests conducted by Boss and Mayes Testing Engineers, Inc. (BMTE) on May 15. Based on the test results and the on-site observations of Mr. R. G. Clausen of BMTE, I decided to use a value for f'c equal to 5000 psi for capacity computations in the load rating analysis.

The report that we are submitting includes backup calculations and BRIDGE™ output, as well as a copy of the BMTE test results letter of May 19 and the latest bridge and UBIT inspection reports. It is a complete document and supersedes all previous load ratings reports.

Please note that weight limitations, although much improved, are still recommended for the AASHTO Type 1 and Type 2 vehicles, as shown on page 2 of the report.

If you have any questions or comments about our report or the results, please do not hesitate to call me.

Sincerely,

HOWARD NEEDLES TAMMEN AND BERGENDOFF, INC.

Thomas J. Cossette

Thomas J. Cossette, P.E.

TJC:fg
Report Enclosed

BOSS & MAYES
TESTING ENGINEERS, INC.

May 19, 1995

Mr. Don Peterson
Pierce County Public Works
2401 S 35th Street, Room 150
Tacoma, WA 98409-7485

Re: Core Strength Results
Fox Island Bridge
BMTE Project No. 10895

Dear Mr. Peterson,

As you requested, Boss & Mayes Testing Engineers, Inc. (BMTE) conducted compressive strength testing of four cores extracted from both sides of the bridge. Two cores from each side were taken from the first beam next to the approach. The selected beam supported the sidewalk side of the bridge.

In conjunction with the extraction of cores, a brief visual assessment of the concrete surfaces was conducted. The concrete appeared sound with the surface paste still intact, showing no signs of weathering, nor were rust stains evident which could indicate corrosion due to insufficient concrete cover of reinforcing steel, or concrete of moderate to high porosity.

Witnessing the coring operation, it was evident that the concrete was dense as indicated by the rate of which the core barrel penetrated the concrete. In addition, when cutting the cores for test preparation, it was further evident that the concrete matrix was dense and highly consolidated, with uniform distribution of aggregates.

Cores were saturated in a lime water solution for 24 hours prior to testing, since the in-place concrete is exposed to a moisture environment. The test method used for preparing the cores, and testing were conducted in accordance with ASTM C42, and ASTM C39 respectively. The test results are summarized below:

Location	Compressive Strength (psi)	Equivalent Cylinder Strength (ACI 318) (psi)
Fox Island Side		
1A	5320	6260
1B	5740	6750
Mainland Side		
2A	5900	6940
2B	6100	7180
Average	5770 psi	6780 psi
Standard Deviation	330 psi	390 psi

917-134th St. S.W., Suite A-1 • Everett, WA 98204 • (206) 742-9360 • FAX (206) 745-1737

In analyzing the acceptability of compressive core strengths, it is sometimes helpful to compare core strengths to cylinder strengths which are the basis for design parameters.

As stated in ACI 318, Section R20.2 "Building Code Requirements for Reinforced Concrete", core tests provide approximately 85 percent of the strength of standard cured cylinders given the same concrete, as demonstrated in numerous studies. Therefore, the information has been added to the above table for your convenience.

A summary and discussion of our findings are outlined below:

- Based on the appearance of the in-place concrete, and the cores, it is evident that the matrix is sound and dense, and of good quality.

- A required average strength based on Table 3, ACI 214, "Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete" if concrete strength is critical based on the equation fcr = f'c + ps, where P equals a coefficient of 3, and s is the standard deviation, the required average of 5000 psi for f'c is conservative, based on equivalent cylinders in the above table.

- Likewise, evaluation of the strength based on Table 5.3.2.2, ACI 318, shows that the strengths of the cores would also satisfy the requirement for f'c equal to 5000 psi required strength, again based on equivalent cylinder strengths.

If you have additional questions or comments, please feel free to contact our office.

Respectfully Submitted,

BOSS & MAYES TESTING ENGINEERS, INC.

Richard G. Clausen
Materials Engineer

RGC:lmm
10895.let

cc: Tom Cossette - HNTB

Bridge Rating Summary

Bridge Name: Fox Island Bridge

Bridge Number: 26211-A (CRP N0. 5355)

Span Type: Reinforced Concrete T-beam, Rolled Steel Beam

Design Load: A.A.S.O. H15-44

Rating by: HNTB

Date: 5/17/95 (fuel truck 7/17/95)

Truck	RF	γ_L	Controlling Member/Point
AASHTO 1	0.92	1.65	Shear at 3ft. from support, west exterior T-beam of 50ft. unit, also note 1 below.
AASHTO 2	0.88	1.65	Shear at 3ft. from support, west exterior T-beam of 50ft. unit.
AASHTO 3	0.98	1.65	(see note 1 below)
AASHTO HS20	0.67	1.65	Shear at 3ft. from support, west exterior T-beam of 50ft. unit
OL-1	0.72	1.30	Shear at 3ft. from support, west exterior T-beam of 50ft. unit.
OL-2	0.60	1.30	Shear at 3ft. from support, west exterior T-beam of 50ft. unit, also note 2 below.
"fuel truck"	1.06	1.30	Shear at 3ft. from support, west exterior T-beam of 50ft. unit.

Notes:

1. Flexure in deck slab between T-beams of the 2-span and the 3-span units.
2. Shear in west exterior T-beam at 17ft. from end of cantilever of 2-span unit