QUARTERLY PROGRESS REPORT

January, 1 2012 to March, 31 2011

In this reporting period HAAM awarded the task order (see below) to start the work on updating the FHWA – FST2DH simulation software. The work will be conducted by the Hydraulics Laboratory Contractor Genex Systems.

TECHNICAL APPROACH

Genex Systems (Genex) understands the objective of this task is to update the two-dimensional hydraulic modeling program FST2DH to take advantage of the greatly increased computational power in the past decade and to incorporate the latest revisions on bridge scour evaluation methods.

Genex will provide quality resources, which include a program manager and specialized consultants. Genex will perform the following:

Task 1. Task Order Monitoring:

Genex will assemble a Technical Advisory Committee (TAC) for this task, and the committee members will include members from the FHWA National Hydraulics Team. The TAC will provide oversight and guidance on all aspects of the project. As means of monitoring the progress and providing timely guidance to the progress, periodical (quarterly) and special conference calls or webinars will be organized.

Task 2. Improvement of Equation Solution Schemes:

This task involves implementation of multi-core features into the FST2DH program. Parallel versions of iterative and direct solution methods for solving systems of equations will be added to reduce computation time, thereby increasing productivity and wider application of the FST2DH program. In order to achieve this objective, Genex will perform the following sub tasks.

Task 2.1 - Genex will investigate the feasibility and the implementation issues in the use of a multi-core processor version of the FST2DH software. Upon completion of the investigation, Genex will recommend any necessary modification to the final approach.

Task 2.2 – Genex will develop a multi-core processor version of the FST2DH software in accordance with the Software Requirements noted below. This includes revising the solution scheme for the existing version of the software to take advantage of the multi-core processors. Genex will implement one parallel version of a popular Krylov subspace iterative method (such as GMRES, Bi-CG-Stab, TFQMR, or LSQR), as well as one modern solver for large, sparse, non-symmetric systems of linear equations, particularly those that work well on high performance computing platforms, such as one contained in the SuperLU or MUMPS software packages.

Software Requirements

- Software code will be written in a standard, available software language and having compilers readily available to the Government (i.e., FORTRAN, BASIC, C++, etc).
- All software development tools used in producing the product will produce non-proprietary executable programs.
- The Government will be able to readily obtain these development tools and re-produce the software product.
- Genex will provide a written description of all language and tools for the Government's approval before beginning any coding.

The PM will continuously monitor the task progress based on established performance parameters, including cost, schedule and quality. Request for approval on the selected development platform, numerical tools, and other resources will be sent to the government before programming work starts. Progress and any identified issues will be provided in quarterly report

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DELIVERABLES

In support of this task, Genex will provide the following deliverables.

Quarterly Reports: Genex will provide quarterly progress reports to the FHWA and to any other reviewers designated by the CO.

- Documentation all the work conducted in Task 2 and Task 3. As instructed by the Government, the work considered under Task 2 and Task 3 is to be considered as an interim deliverable.
- The deliverable will contain a compiled executable program, source code, and complete documentation of the computational methods employed by the program.

A preliminary of delivering schedule is shown below:

Approximated date	Deliverable/milestone
End of 1st month	Assembly of TAC and meeting organization.
End of 4th month	Quarterly report
End of 8th month	Final software package, source codes, and complete documentation.

All deliverables will be prepared in accordance with requirements established by Genex and the COTR. The final documents shall be delivered to the COTR at the following address:

Federal Highway Administration
Turner-Fairbank Highway Research Center
Attn: Kornel Kerenyi, HRDI-50
6300 Georgetown Pike
McLean, VA 22101