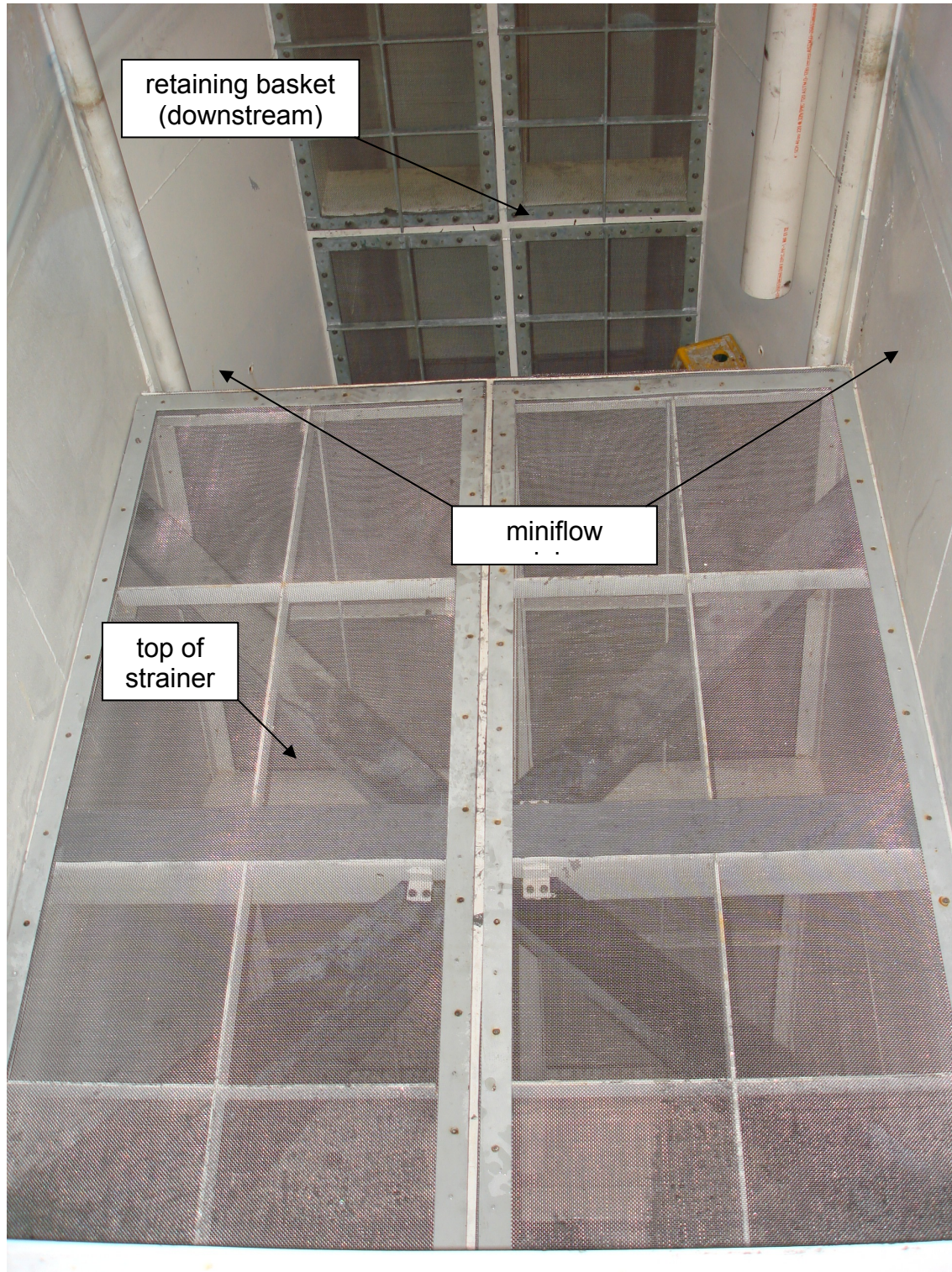
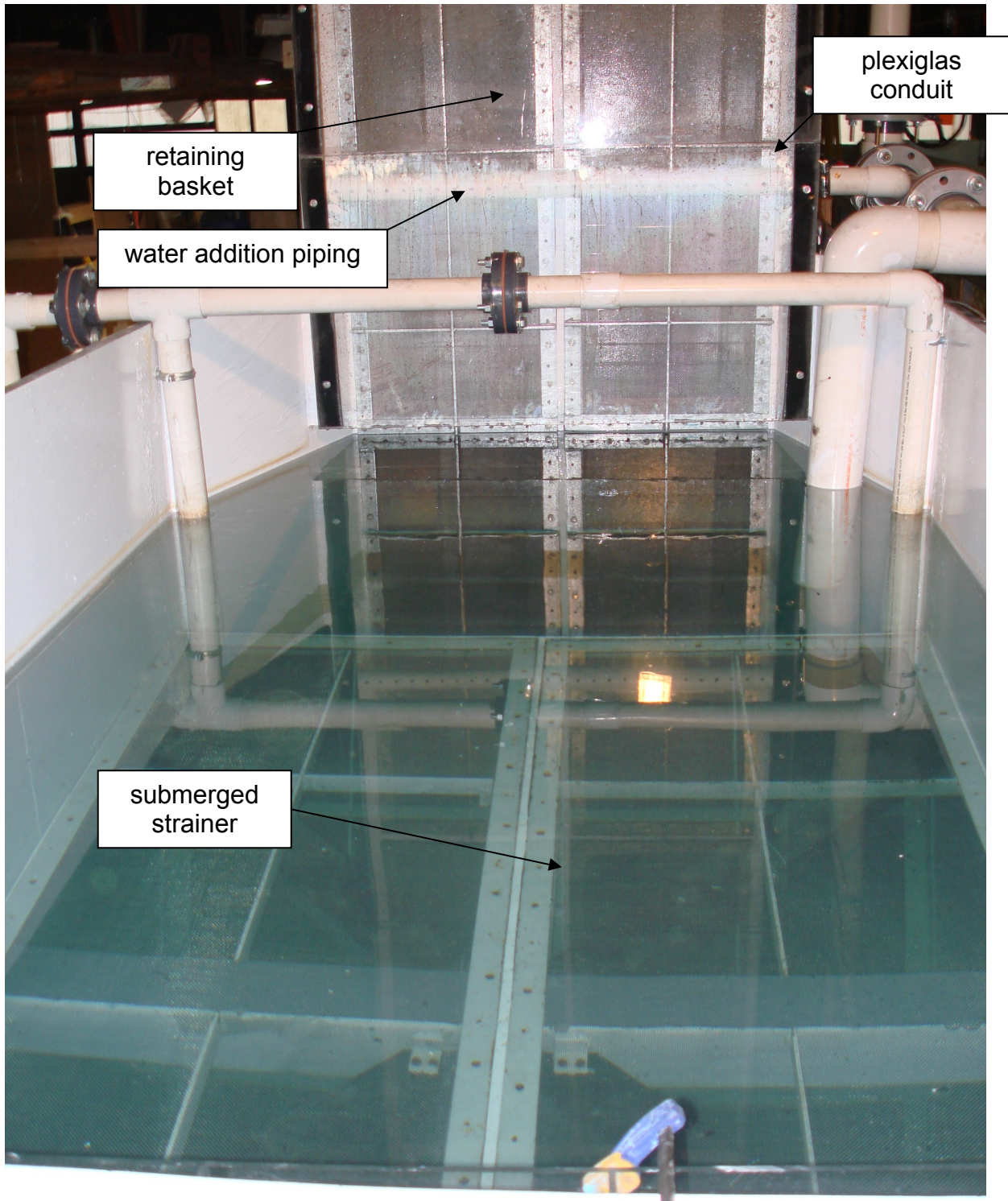


**Figure E.3-5 Strainer, Retaining Basket, and Miniflow Lines Within
the Phase 2 Test Flume**



**Figure E.3-6 Strainer, Retaining Basket, and Components Within the
Phase 2 Test Flume**



E.3.2 Flume Recirculation Loop

The flume recirculation loop is constructed mostly from four and six inch diameter pipe. Flow is provided by a centrifugal pump controlled by a variable frequency drive. The main flow from the strainer suction is routed above the retaining basket to simulate plant flow conditions from the heavy floor into the retaining basket. This flow is measured through a calibrated orifice meter and discharges through a common header. A secondary flow loop circulates a small portion of the total flow from the sump suction directly into the flume water pool between the retaining basket and strainer to simulate the ECCS miniflow. The miniflow is also measured by a calibrated orifice meter. The miniflow is split into two pipes (each 2 inches in diameter) that route water to the bottom of the flume's pool between the retaining basket and the strainer. At the bottom of the pool the miniflow is discharged via perforations in the piping along the flume floor. The perforations are oriented such that the discharge flow conservatively creates turbulence to prevent debris settling. The tests are conducted with city domestic water. For testing, the flume water is heated and maintained at approximately 120°F via a heat exchanger connected to the recirculation loop.

E.3.3 Test Instrumentation

The flume test instrumentation consists of flow meters, level indication, differential pressure cells, and temperature instruments. A debris scale is used for weighing debris.

Flow instrumentation is provided for the flume recirculation loop. Differential pressure cells measure the flow differential pressure across the retaining basket and strainer.

Level instrumentation is provided to monitor and control the flume water levels.

Temperature instrumentation monitors the flume water temperature. A debris scale is used to weigh the debris in a dry state. The test instrumentation is calibrated using methods traceable to National Institute of Standards and Technology (NIST) or other reputable standards or procedures.

E.3.4 Debris Mixing

The test debris was thoroughly wetted with warm water and mixed with a power mixer prior to introduction into the test flume. To prevent fibrous debris agglomeration, the fiber was separated into batches of approximately $\frac{1}{2}$ lb_m per 33 gallon drum prior to mixing. The fiber was allowed to soak in the warm water prior to flume introduction.

E.3.5 Debris Introduction

For the Phase 1 Debris Transport Test, debris was manually introduced into the flume above the retaining basket.

For Phase 2 testing, the debris was primarily introduced through a nozzle above the retaining basket using a pump and debris introduction tank. Figure E.3-7 depicts the debris introduction nozzle and Figure E.3-8 depicts the debris introduction tank and pump. After the particulate and fiber were added to the test flume, the debris introduction tank was flushed with clean water. Additionally, after the debris introduction tank and hose was flushed, the pump and feed hose was drained at the base of the pump. Except for Test 3 (Fibrous Debris Only Sample Bypass Test), the pump was dismantled following the introduction of all non-chemical debris to ensure debris was not trapped within the pump internals.

Figure E.3-7 Debris Introduction Nozzle

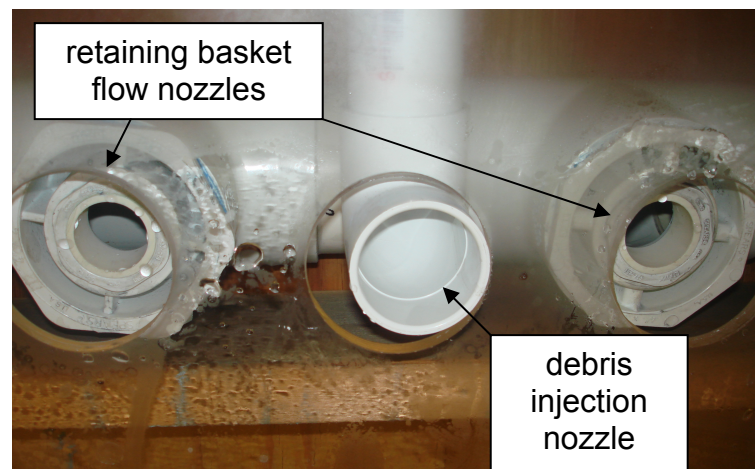


Figure E.3-8 Debris Introduction Tank and Pump

During Test 2 (Design Basis Debris Loaded Strainer Head Loss Test), the pump seal failed during the addition of the 'dirt and dust' debris source. Debris introduction was temporarily halted and the debris introduction tank was drained via the pump drain into a container to be added to the flume. The pump was dismantled and the debris within the pump casing was collected and added to the container holding the drained debris. Some debris laden water that leaked from the pump was recovered and also added to the storage container. The failed pump was replaced. It was determined that the debris pumps were unable to pump the 'dirt and dust' debris. Therefore, the 'dirt and dust' and tin powder were added through the observation window (via the debris introduction chute) above the retaining basket for Test 2 and Test 4 (Debris Loaded Strainer Head Loss Thin Bed Test). The contents recovered during the pump malfunction were also added to the test flume through the observation window. The plexiglas window was replaced after the debris constituents were added to the flume. Figure E.3-9 depicts the flume observation window and Figure E.3-10 depicts the debris introduction chute.

Figure E.3-9 Flume Observation Window



Figure E.3-10 Debris Introduction Chute

