INSPECTION AND DEMOLITION OF STEBBINS TILE TEST MODULE

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INTRODUCTION

During the week of December 8, 1997, the Stebbins Tile Test Module at the NYSEG Kintigh Station was inspected and demolished. The inspection included:

- Photographs of the tile-lined interior of the module were taken.
- Grout joint profile depth measurements were made around the "Refrax" plugs on the north and south walls.
- Six 4-inch diameter cores were removed from the north, south, and west walls.
- Steel reinforcement bars were inspected as the concrete walls and base were demolished with a jackhammer.
- The six cores from the walls and corroded steel reinforcement bars collected from the concrete base were photographed.
- Concrete cylinders submerged in the limestone slurry at the bottom of the test module were removed for compressive strength and other testing.

The total elapsed time on the test module was 3.2 years since start-up. The slurry pump which circulated limestone slurry through spray nozzles pointed at the four walls operated a total of 1.8 years.

SUMMARY

1. The tile on the interior of the module appeared to be in good condition with no obvious erosion or deterioration of either the glazed or unglazed tiles.

2. The tile grout (Stebbins AR-196 Resin Cement) showed no signs of deterioration.

3. Grout joint profile depth measurements around the "Refrax" plug did not reveal any signs of grout loss.

4. A visual examination of the six cores removed from the walls revealed the presence of shrinkage or thermal cracks and parting lines between concrete pours. None of these cracks and parting lines affected the performance of the tile lining.

5. The steel reinforcement bars in the walls showed no signs of corrosion even in areas where leakage was allowed to occur.

6. The steel reinforcement bars set in the concrete foundation slab to serve as dowels from the slab into the walls were corroded at the parting line between the concrete slab and the concrete wall. No external leakage was ever observed at the foundation slab along the east and south walls where the corroded dowels were found.

INSPECTION AND EXAMINATION RESULTS

History

A brief history of the Stebbins Tile Test Module in listed in Table 1.

Semplate Tile Interior

Appendix 1.0 contains overall photographs of the four walls, photographs showing the condition of the grout between a split tile on the south wall, and photographs of the "Refrax" plugs on the north and south walls. Figures 1.1 and 1.2 show the results of joint profile depth measurements at the "Refrax" plugs. The maximum depth measured was 0.104" and minimum of 0.00" indicating a very little or no loss of grout in the joints.

Core Sample Examination

Appendix 2.0 contains a listing of the six 4" diameter core samples showing location and tile condition, and photographs of each core sample and the core hole. The examination of the cores was visual. More detailed testing of the cores may be done at a later date. The visual examination of core samples revealed the presence of shrinkage or thermal cracks which did not cause the interior tile face to leak.

Steel Reinforcement Bars

The steel reinforcement bars in the walls were in good condition and no corrosion was found in areas deliberately allowed to leak. Appendix 3.0 contains photographs of corroded reinforcement bars removed from the concrete foundation slab of the test module that were found at the bottom of the east and south walls. The reinforcement bars were used as dowels to connect the walls to the concrete foundation slab and extended from the concrete in the slab to the concrete in the wall. Based on an examination during demolition, the location of the corrosion on the dowels is at the parting line between the concrete in the slab and the wall, which were poured at different times. Some corrosion was also found at a location lower on the dowel which would be further into the slab. During the demolition, it was also noted that the mastic sealant, normally applied between pours, was adhering to the dowels which was not observed at all the other areas where the mastic sealant had been applied.

Figure 3.2 shows the actual location of the dowels based on photos taken during construction and observations during demolition. According to the original drawings, the dowels were to pass through a keyway in the slab. Instead, the dowels were set just behind the first row of tile. This may have prevented the mastic sealant from being set down to the concrete surface of the slab at the dowels.

The presence of corrosion on the dowels in these areas seems to indicate that some leakage occurred in the grout joint between the floor tile and wall tile. The mastic sealant failed to keep the liquid from contacting the dowel bar. The amount of leakage was apparently very small since there was never any sign of leakage at the exterior of the slab.

Table 1

STEBBINS TILE TEST MODULE HISTORY

Date	Total Elapsed Time-Hr.	Pump Operating Time- Hr.
9-17-94[1]	0	0
12-15-94[2]	2,136	2,101.5
5-16-95[3]	5,784	5,509
10-5-95[4]	9,192	7,986
1-17-96	11,688	9,572
7-23-96	16,176	10,295
2-20-97	21,264	13,724
6-2-97	23,712	13,724
12-5-97[5]	28,176	16,239

1. Leakage occurred in latency concrete area of south wall, but later stopped.
2. Holes were drilled in latency concrete area of south wall to reestablish leakage.
3. Holes in latency concrete area of south wall were filled with 3M Scotch seal chemical grout No. 5600 foam.
4. Three cracked tiles were removed from the east wall and replaced.
5. 1 year = 8,760 hours, 3 years = 26,280 hours.

12/16/97
1621-26-18

APPENDIX 1.0

SEMPLATE TILE AND GROUT INTERIOR FACE EXAMINATION

CONTENTS: PHOTOS 1.1 THRU 1.8
FIGURES 1.1 THRU 1.2

Photo 1.1 North wall, areas circled indicate where 4" diameter cores were removed.
(see appendix 2.0 for tile identification).

Photo 1.2 South wall, areas circled indicate where 4" diameter cores were removed.
(see appendix 2.0 for tile identification).

Photo 1.3 West wall, areas circled indicate where 4" diameter cores were removed.
(see appendix 2.0 for tilt identification).

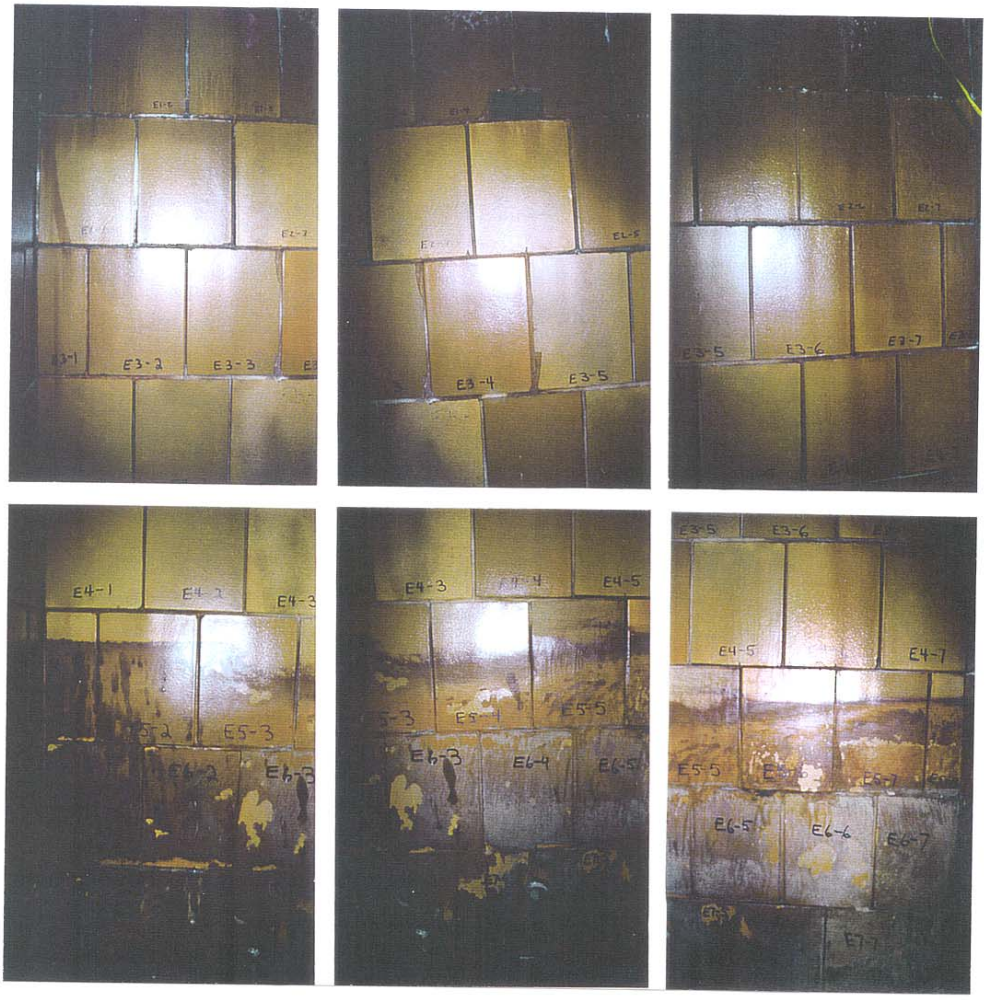

Photo 1.4 East wall, areas circled indicate where 4" diameter cores were removed.
(see apprendix 2.0 for tile identification).

Photo 1.5 Split tile and refrax plug in spray impact area, photographed in October 1995 after 7,986 hours of operation.

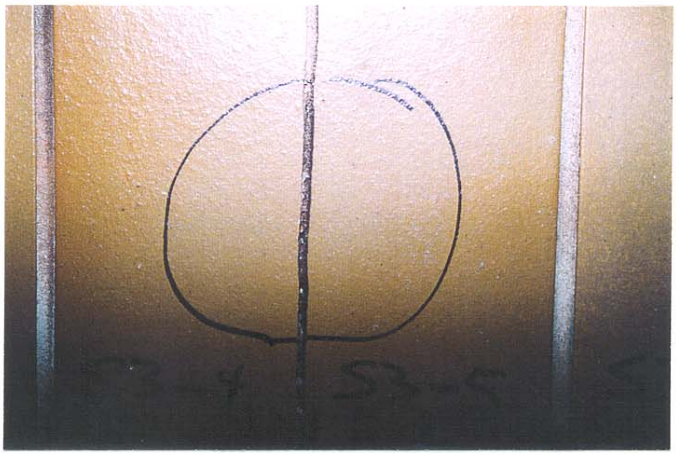

Photo 1.6 Split tile on south wall, photographed on December 8, 1997 after 16,239 hours of operation shows no change in the grout.

Photo 1.7 "Refrax" plug on north wall shows grout to be in good condition after scale had been scraped off. This plug was located below the normal slurry level.

Photo 1.8 "Refrax" plug on south wall shows grout to be in good condition. This plug was located in a spray impact area above the normal slurry level.

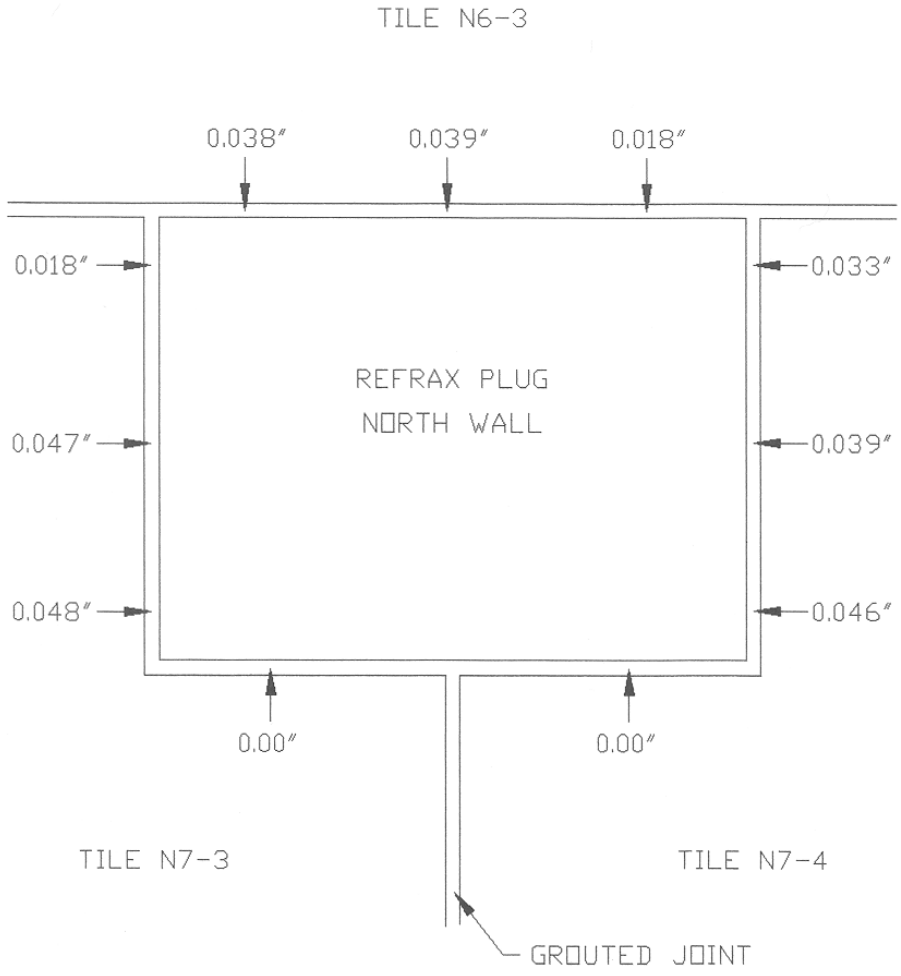

Figure 1.1 Joint profile depth measurements.

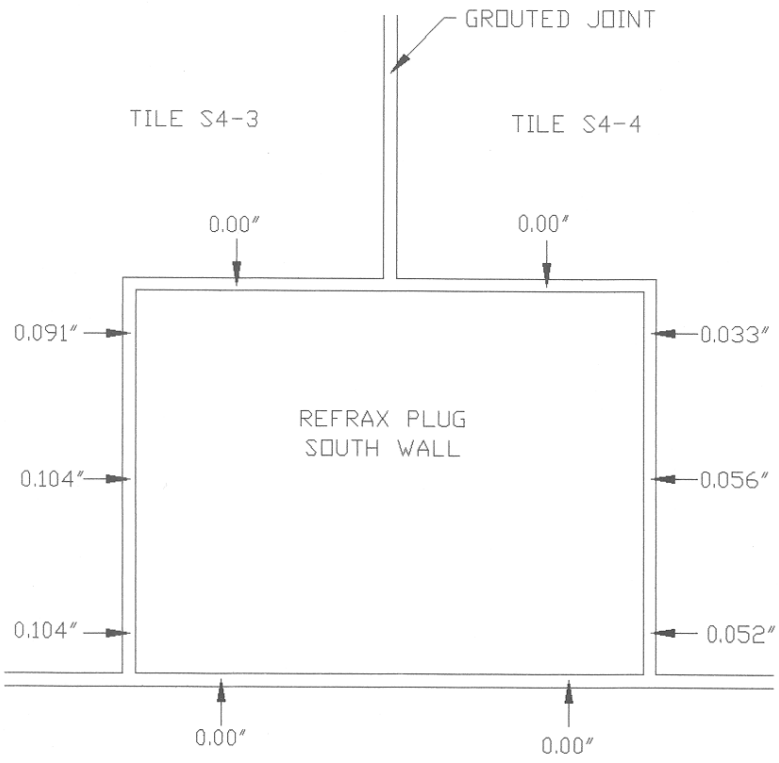

Figure 1.2 Joint profile depth measurements.

APPENDIX 2.0

CORE SAMPLE EXAMINATION

CONTENTS: TABLES 2.1 AND 2.2
FIGURES 2.1 THRU 2.4
PHOTOS 2.1 THRU 2.25

4″ DIAMETER CORE DRILL LOCATIONS	
TILE CONDITION	LOCATION
GOOD TILE/ABOVE SPRAY	N2-4
CRACKED TILE	N3-4
TILE W/DRILLED HOLE (latency concrete)	S7-4
REPLACED TILE	W6-4
GOOD TILE/SUBMERGED	W5-4
SPLIT TILE	S3-4, S3-5

Table 2.1 4″ diameter core drill locations.

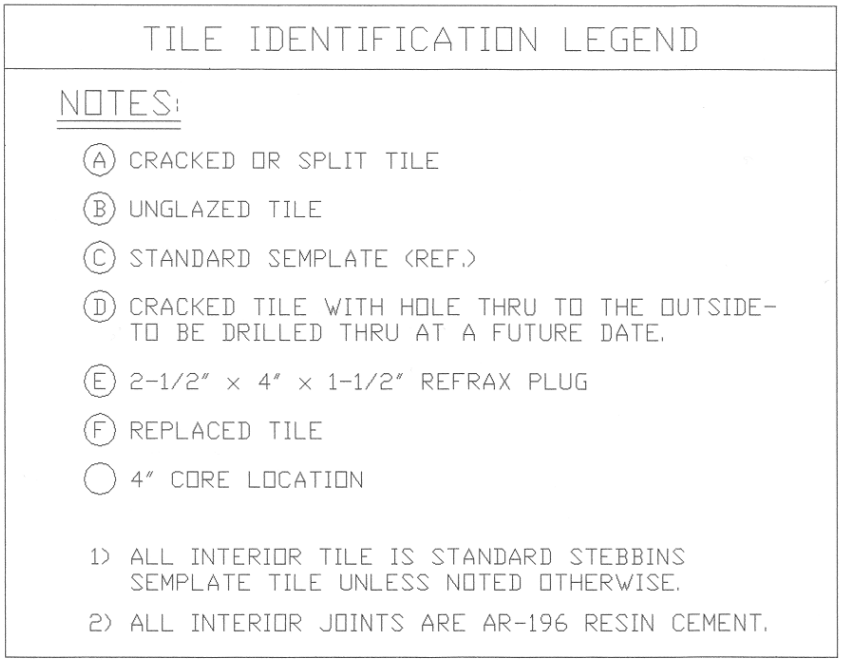

Table 2.2 Tile identification legend.

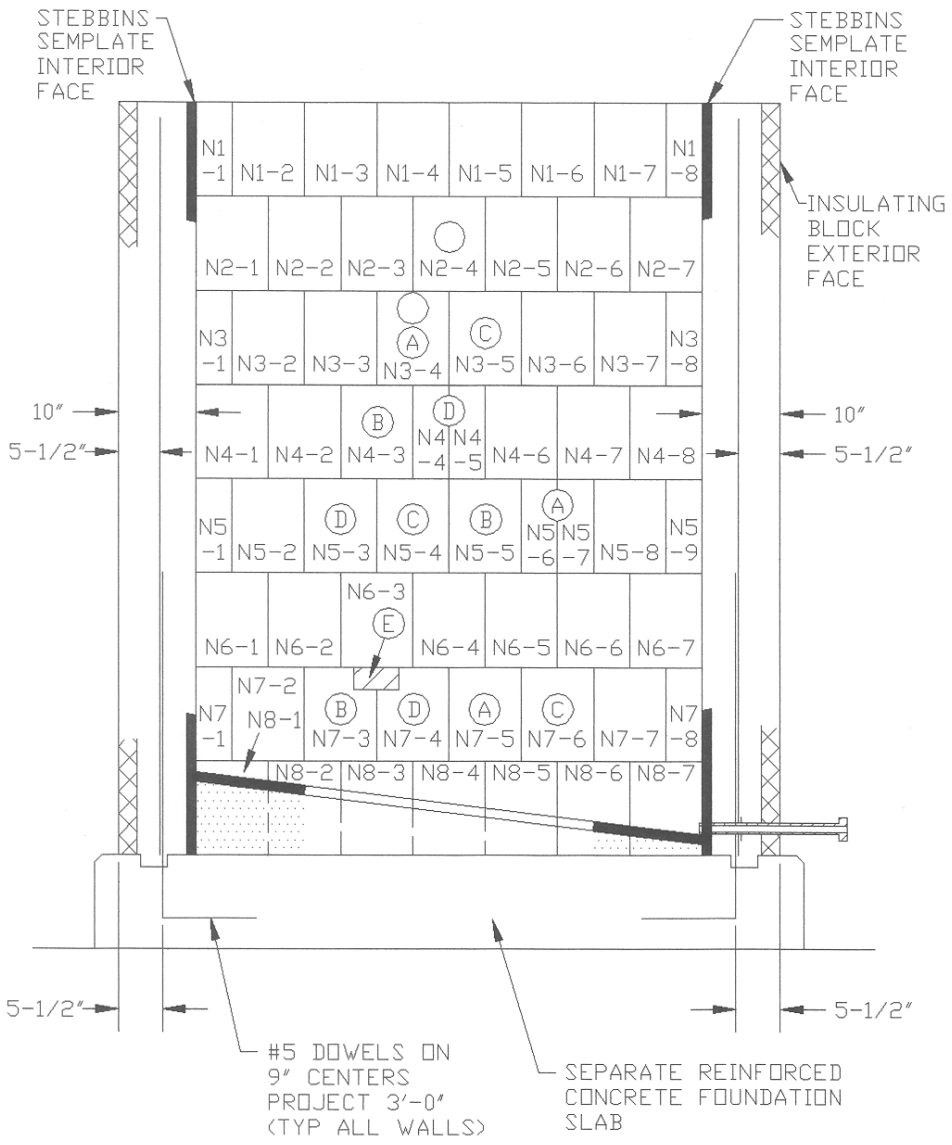

Figure 2.1 North wall - tile identification

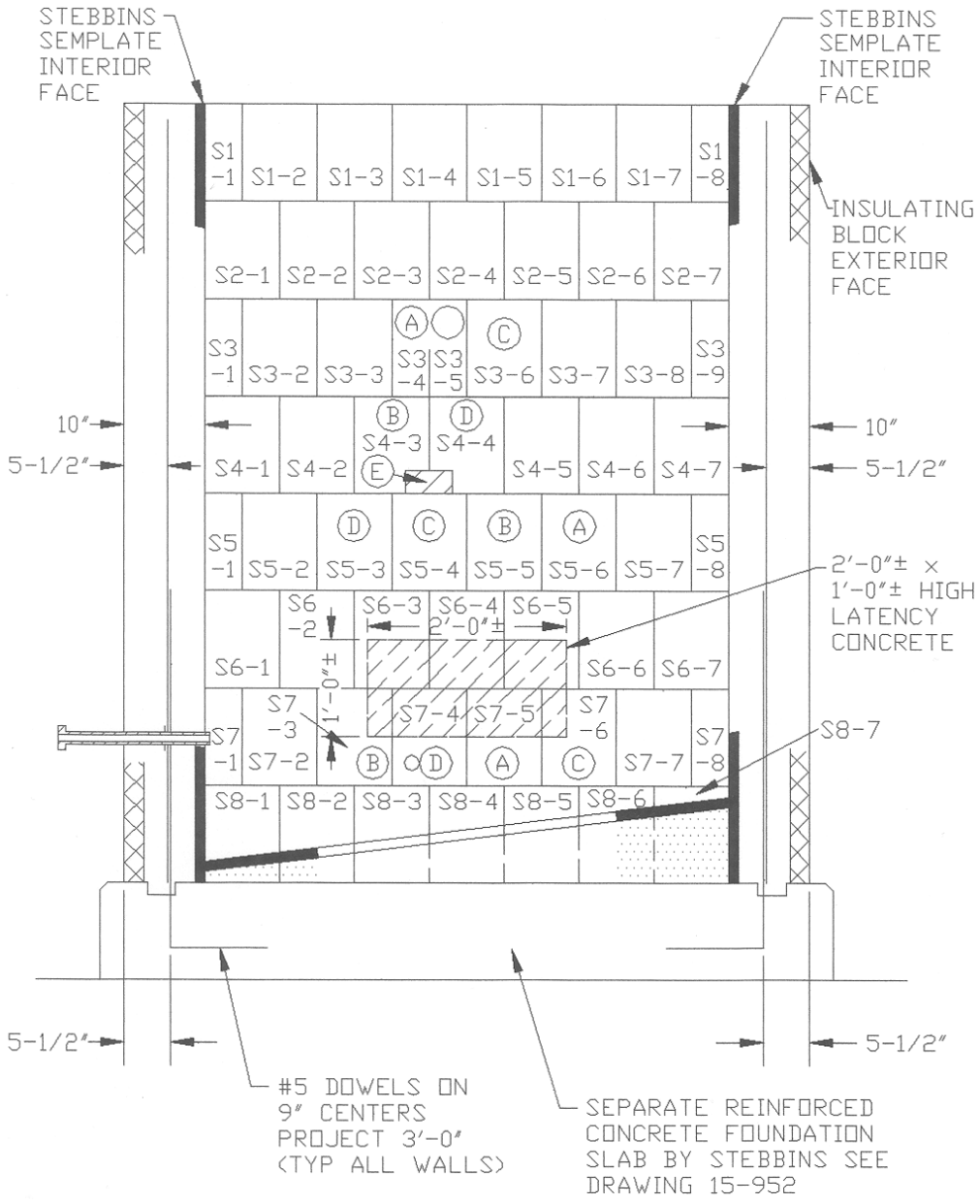

Figure 2.2 South wall - tile identification.

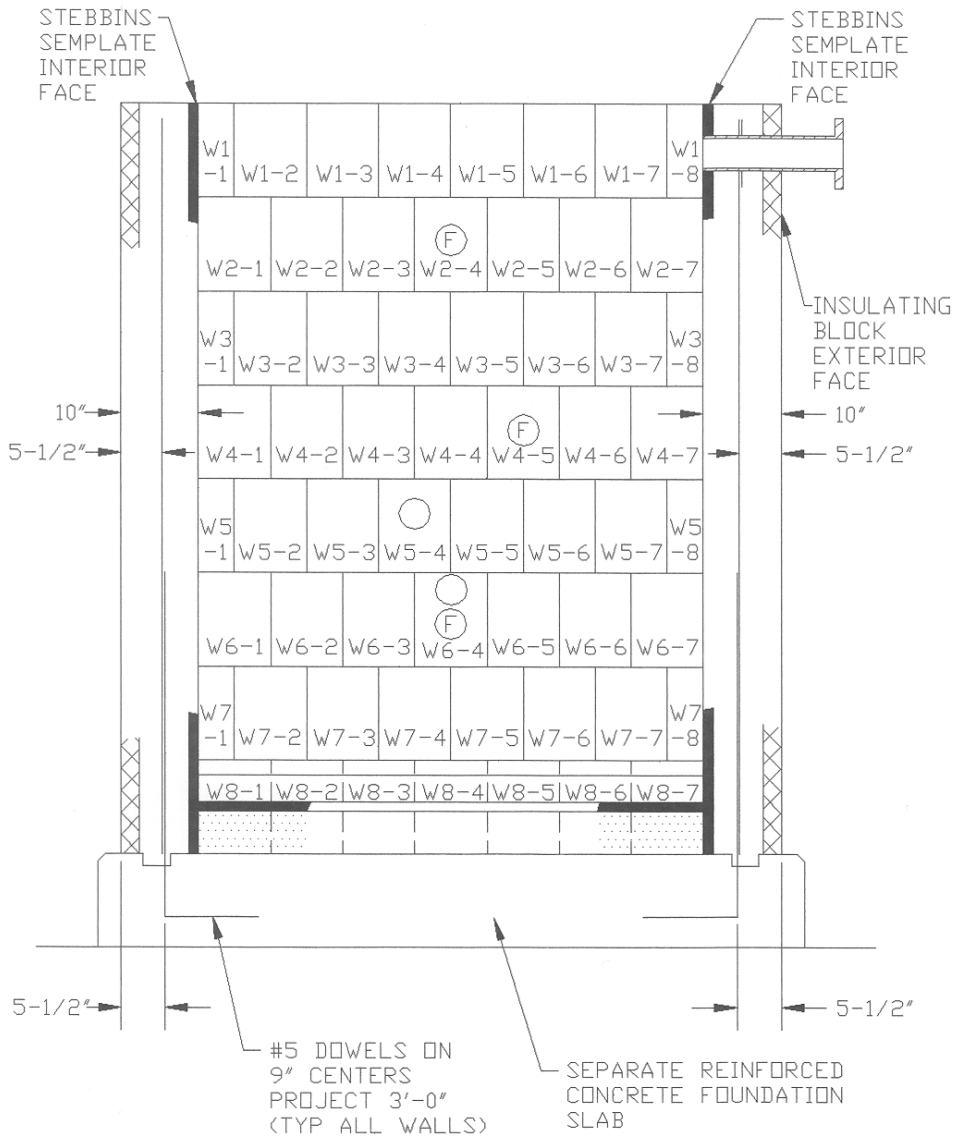

Figure 2.3 West wall - tile identification.

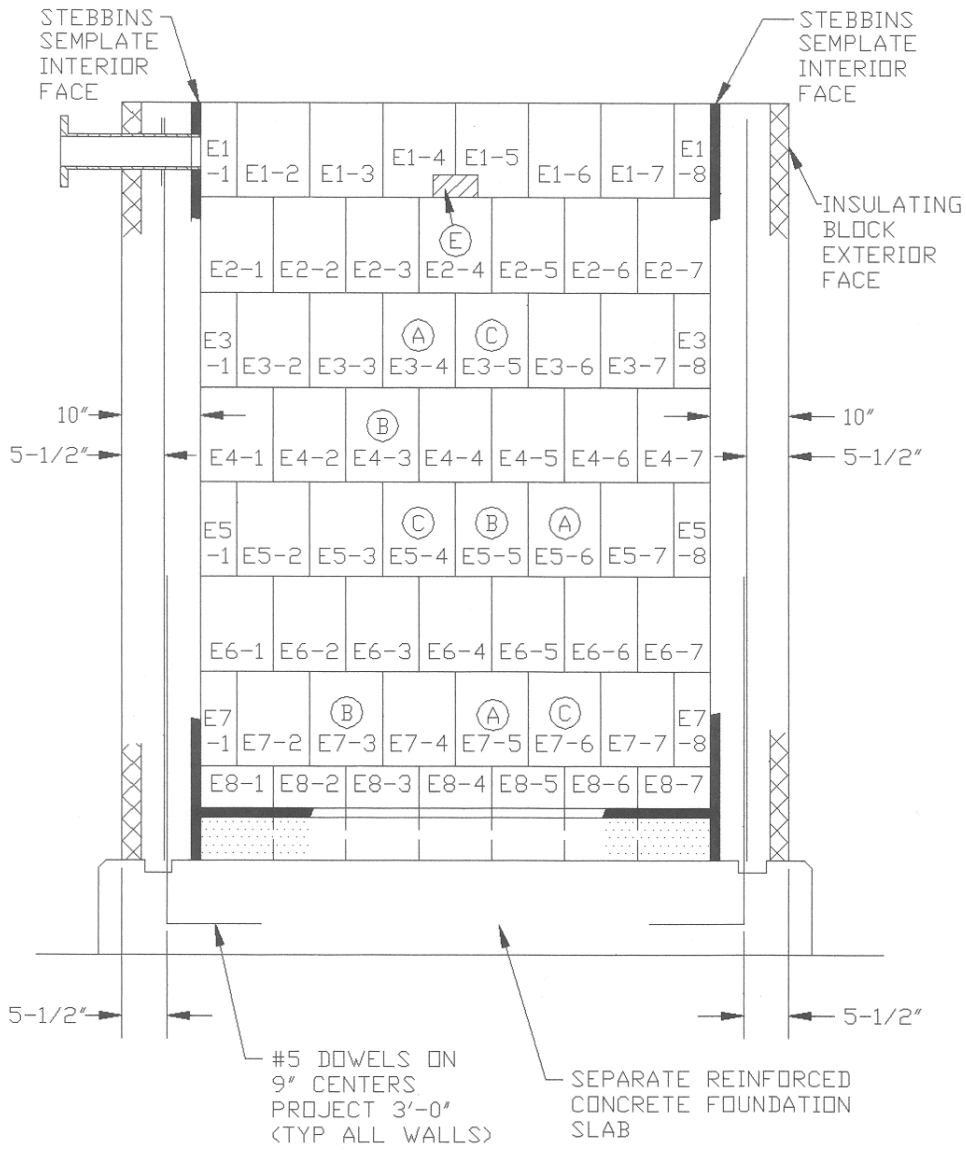

Figure 2.4 East wall - tile identification.

Photo 2.1 "A" shrinkage or thermal crack starting at a vertical mortar joint which protruded into the concrete. Crack "B" see photo 2.2.

Photo 2.2 Crack "B" appears to be a parting line between concrete pours since core was removed from the middle of a row of tile.

Photo 2.3 Crack "B" appears to be a parting line between concrete pours. (see photo 2.1). Two pieces of cement from the tile joint are also evident.

Photo 2.4 Crack "A" appears to be a parting line between concrete pours due to the presence of the mastic sealant normally applied to the previous pour.

Photo 2.5 Cracked tile and no evidence of leakage.

Photo 2.6 Same as photo 2.4 and no evidence of shrinkage and thermal cracks.

Photo 2.7 "A" shrinkage of thermal crack starting at a mortar joint.

Photo 2.8 Removal of cracked piece shows a void "B".

Photo 2.9 Split tile repaired with cement.

Photo 2.10 "A" drilled hole with sealant. No evidence of cracks.

Photo 2.11 No evidence of cracks or leakage.

Photo 2.12 No evidence of cracks or leakage.

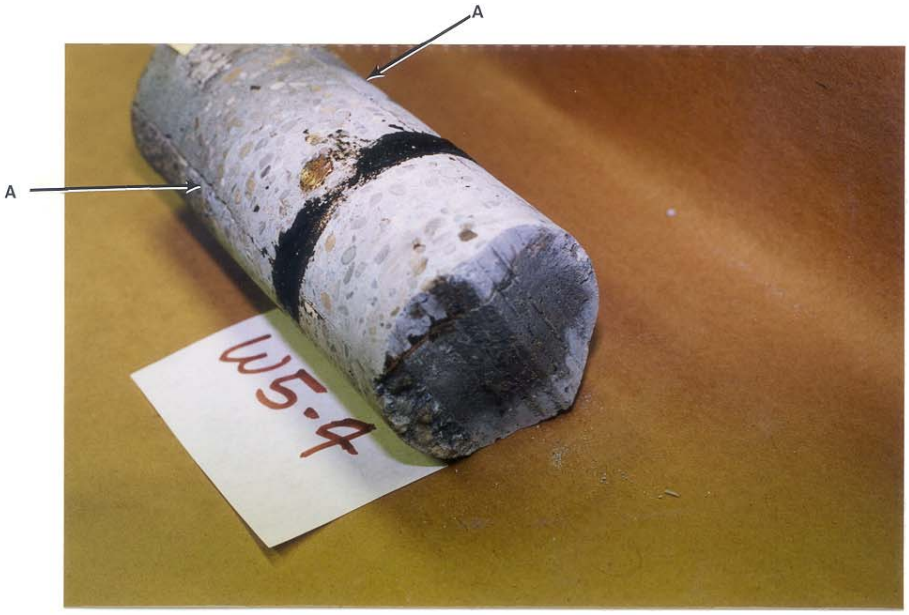

Photo 2.13 Crack "A" appears to be a parting line between concrete pours due to the presence of mastic sealant placed between pours.

Photo 2.14 Same as photo 2.13.

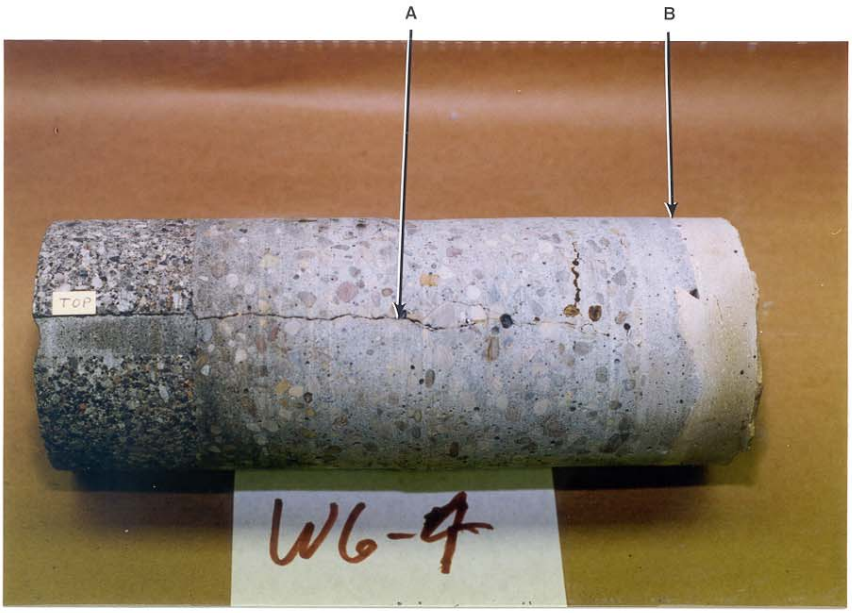

Photo 2.15 "A" shrinkage or thermal crack starting at a mortar joint in the insulating block wall. "B" sand/cement mix placed behind a tile which was replaced.

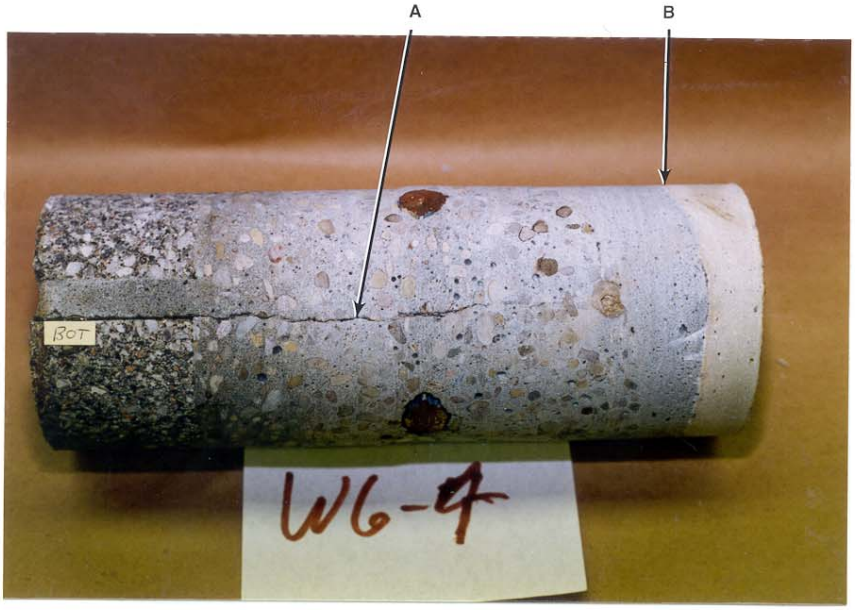

Photo 2.16 Same as photo 2.15.

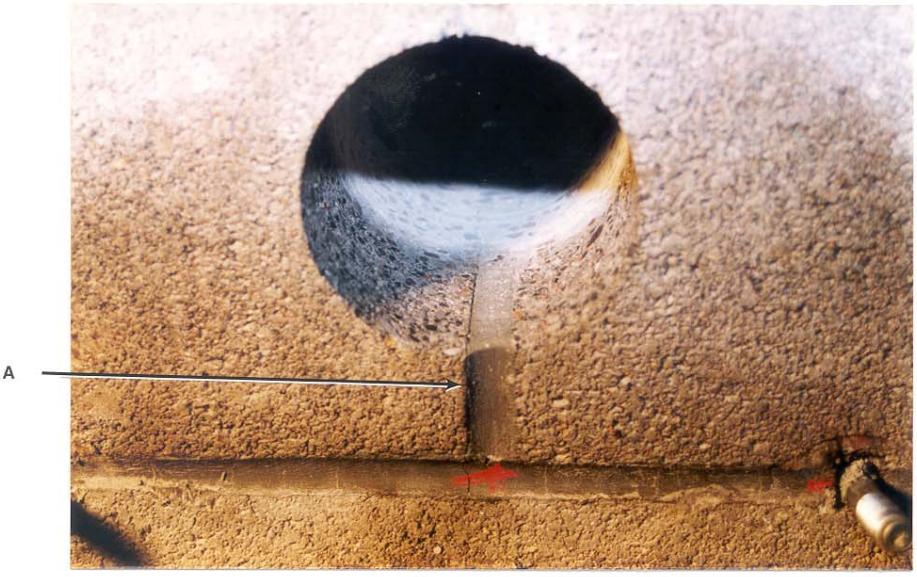

Photo 2.17 Core hole N2-4, "A" shrinkage or thermal crack in mortar joint extending into the concrete wall.

Photo 2.18 Core hole N3-4.

Photo 2.19 Core hole N3-4.

Photo 2.20 Core hole N3-4.

Photo 2.21 Core hole S7-4.

Photo 2.22 Core hole S7-4, sealant used to plug drilled holes is evident.

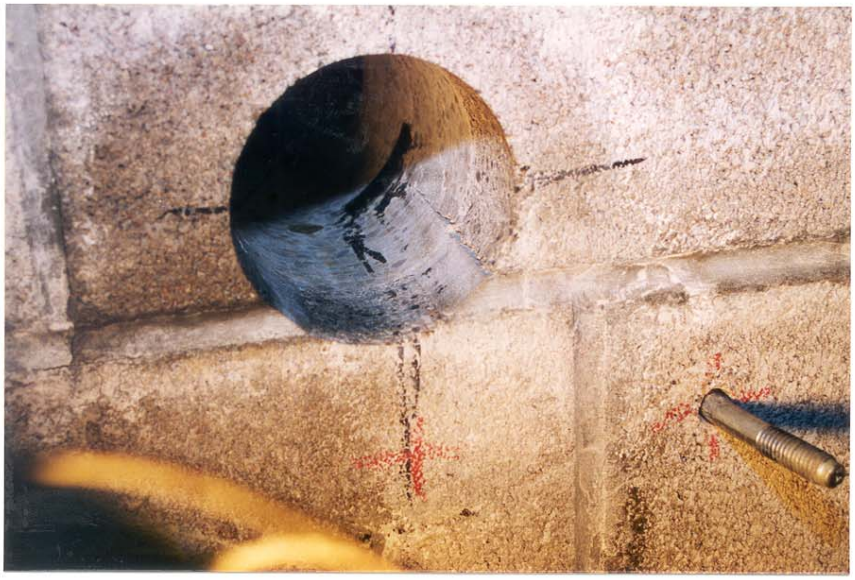

Photo 2.23 Core hole W5-4, parting line between concrete pours corresponds to the parting line in the core.

Photo 2.24 Core hole W5-4.

Photo 2.25 Core hole W5-4.

APPENDIX 3.0

STEEL REINFORCEMENT BAR DOWEL CORROSION EXAMINATION

CONTENTS: PHOTOS 3.1 THRU 3.12
FIGURES 3.1 AND 3.2

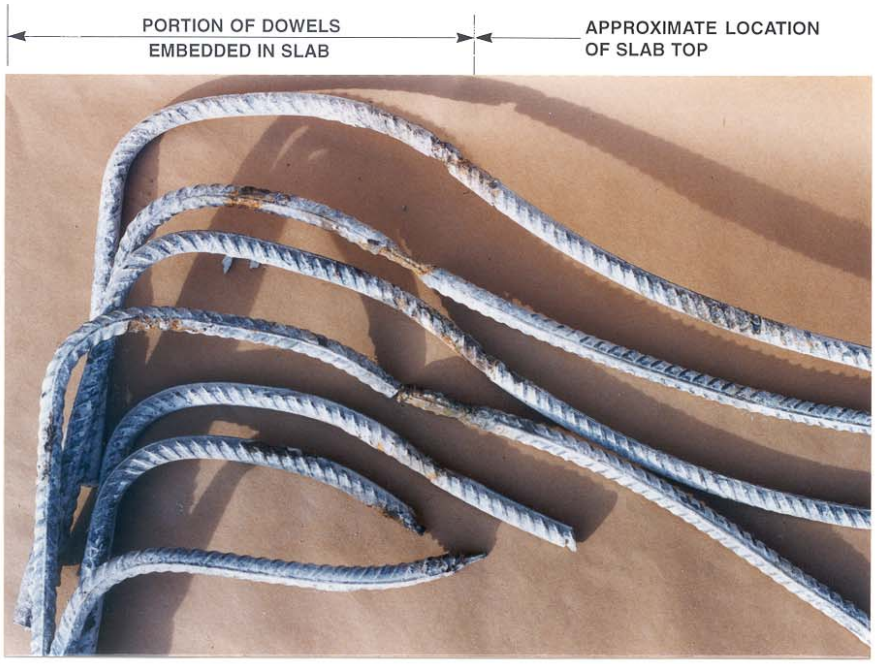

Photo 3.1 Corroded #5 dowels removed from concrete slab along east and south walls.

Photo 3.2 Corroded #5 dowels removed from concrete slab along east and south walls. Viewed 90° from photo 3.1.

Photo 3.3 Dowel "A" showing corrosion at two locations.

Photo 3.4 Dowel "A" close-up.

Photo 3.5 Dowel "A" and "B".

Photo 3.6 Dowel "C".

Photo 3.7 Dowel "D" showing corrosion at two locations. Vertical portion of dowel broke off during demolition.

Photo 3.8 Dowel "E" showing corrosion at two locations. Vertical portion of dowel broke off during demolition.

Photo 3.9 Concrete foundation slab during construction.

Photo 3.10 Concrete foundation slab with dowels and first two courses of insulating block.

Photo 3.11 Concrete foundation slab with first row of tile installed.

Photo 3.12 Floor tile and wall tile joint.

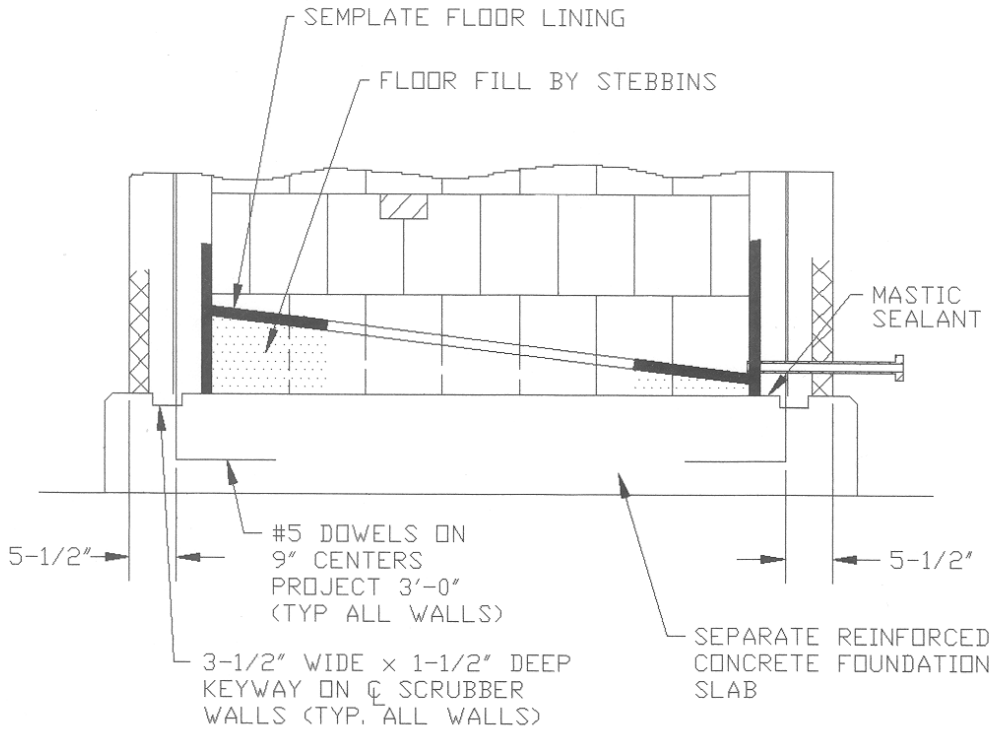

Figure 3.1 Dowel location as specified on original drawing.

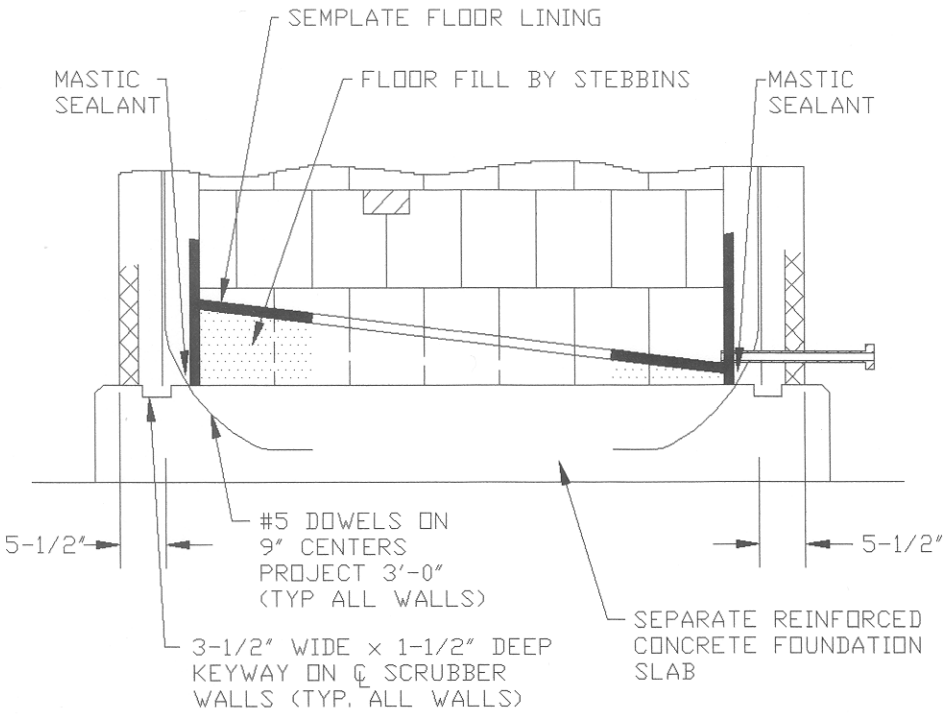

Figure 3.2 Actual dowel location based on photos 3.9 &3.10 and obeservations during demolition.