ATLANTIC ENGINEERING SERVICES

Structural Condition Assessment
Truman Water Front Park, Building 103
Key West, Florida

Prepared For

William P. Horn Architect, P.A.
915 Eaton Street
Key West, Florida 33040-6922

Prepared By

Atlantic Engineering Services of Jacksonville
6501 Arlington Expressway, Building B, Suite 201
Jacksonville, FL 32211

AES Project No. 314-192
December 4, 2014

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December 4, 2014

Mr. William P. Horn, RA, LEED AP, BD+C
William P. Horn Architect, P.A.
915 Eaton Street
Key West, Florida 33040-6922

Re: Structural Condition Assessment
Truman Water Front Park, Building 103
Key West, Florida

Project: #314-192

Dear Bill:

Atlantic Engineering Services of Jacksonville (AES) has completed its structural condition assessment of Building 103 at the Truman Water Front Park located in Key West, Florida. Our assessment consisted of a visual review of the structure on October 15 and 16, 2014, along with carbonation testing, chloride testing and concrete compression strength testing. Concrete chloride testing and compression testing were performed by AMEC Environment Infrastructure, Inc. and carbonation testing was performed by Atlantic Engineering Services of Jacksonville (AES). Present at the site were Ms. Olivia Elsworth, Ms. Elena Khranovskaya, Mr. William P. Horn, RA, LEED AP, BD+C and Mr. Mark J. Keister, P.E.

BACKGROUND

Building 103 at Truman Water Front Park is a one-story, former central power plant of approximately 14,200 square feet constructed in 1941 with a central high bay and a gantry crane oriented east west, along with lower roofs on both sides to the north and south. The high bay, central roof consists of a concrete flat slab spanning between gabled concrete beams except for the westernmost slab, which is a ribbed concrete slab supported by concrete beams, that span between the end wall and the first gabled concrete beam. Supporting the gabled concrete beams are concrete columns. On either side of the high bay are lower monoslope concrete slabs that span between the crane beam and the exterior wall. At the northwest corner, the low roof consists of a ribbed concrete slab supported by concrete beams, supported by concrete columns. The crane beam is supported by concrete columns located at every other roof gabled, concrete beam with a low roof concrete beam that spans to a concrete column at the exterior wall. The ground floor is a concrete slab on grade with numerous equipment foundation remnants, pits and tunnels. The perimeter walls consist of concrete beams and columns infilled with stucco clad CMU. The north and south, high walls above the low roof at the westernmost bay is a concrete wall. On the south wall of the west end, there is a small lower roof addition with a wood framed roof supported by perimeter CMU walls. It is unknown what the foundations are, but they are either piles bearing on the shallow rock or shallow foundations bearing on the shallow rock. It is unknown at this time if the original construction drawings exist and are available.

OBSERVATIONS

Our structural condition assessment consisted of a visual review of the structure. The survey plans (see Appendix A) approximately, locates deteriorated areas pinpointed during our survey. Concrete carbonation testing was determined at eight (8) locations, concrete chloride testing was determined at seven (7) locations and concrete compression strength testing was determined at seven (7) locations (see Appendix B). The testing locations are noted on the survey plans (see Appendix A).

Fresh concrete has a PH of approximately 12 to 13, which creates a layer of passivity on embedded reinforcing that protects the reinforcing from corrosion. With exposure to atmospheric carbon dioxide, concrete PH slowly decreases over time as carbon dioxide penetrates the concrete. When the concrete PH reduces to a value of about 9 to 10, the passivating layer protecting the reinforcing is destroyed and the reinforcing can corrode due to exposure to oxygen and water. The PH at all eight (8) locations is 9.5 or lower at the face of reinforcing and the concrete is no longer protecting the reinforcing from corrosion near the surface of the concrete.

Chlorides in concrete greatly accelerate corrosion and the lower the concrete PH, the greater the impact of chloride induced corrosion. Chloride content in concrete exposed to moisture should be less than .15% of Cl to weight of cement and the chloride corrosion threshold is 1.2 lbs. of chloride per cubic yard of concrete, which works out to .0317% Cl for concrete weighing 140 lbs. /cubic yard. Of the seven (7) samples tested for chlorides, all but one exceeded the chloride corrosion threshold and three (3), one in a column and two in the floor were very high in chloride content.

Of the seven (7) concrete cores tested for compression, the high strength was 4,920 psi and the low strength was 2,390 psi with an average strength of 3,539 psi. Three (3) of the cores are under 3,000 psi and all of these are in columns.

Approximately half of the columns from the low roof to the high roof are cracked and spalling with corroding reinforcing (see Photograph 1). Approximately half of the lower columns are cracked and spalling with corroding reinforcing (see Photographs 2 and 3). Of these lower columns, the majority are on the north side and several are spalled full height (see Photograph 2). Almost all of the concrete beams above the roof are cracked and spalling and several are severely spalled and deteriorated (see Photograph 4). At the high gable concrete beams, there are isolated areas of cracked and spalling concrete with corroding reinforcing (see Photograph 5). These areas are concentrated on the east and west ends of the building. The crane beam has extensive areas of cracked and spalling concrete with corroding reinforcing (see Photographs 6 and 7). Several of the areas are extensive. At the roof slabs, there are isolated areas of cracked and spalling concrete with corroding reinforcing (see Photographs 8 and 9). These areas are concentrated on the east and west ends of the building. The ribbed low roof slab at the northwest corner of the building has an old roof opening that was cut through two roof joists and was not properly framed (see Photograph 10). This condition will need to be properly framed. There is extensive cracked and spalling concrete with corroding reinforcing at the western high concrete walls (see Photograph 11). The exterior stucco is in poor condition with numerous cracks and areas of delamination (see Photograph 12). Many of these cracks are cracks in the CMU telegraphing through the stucco (see Photograph 13). The majority of the window sills have cracked grout and are in poor condition (see Photograph 14). The roof of the small, lower roof addition is in poor condition with a noticeable hole in it and the CMU walls are noticeably cracked with stair stepped, cracking (see Photographs 15 and 16). The ground floor has numerous pits, trenches, equipment pads and tunnels (see Photograph 17). Some of these may lead to the seawall. In general, the concrete slab on grade, ground floor and tunnel slabs are in good condition with no signs of distress.

EVALUATION AND RECOMMENDATIONS

In general the structure in in fair condition with areas that are in poor condition. There is a great deal of concrete repair required for the columns and beams, and isolated areas of repair for the concrete slabs. The cut roof joists at the ribbed low roof slab, at the northwest corner of the building will require restructuring. The badly deteriorated concrete beams above the low roof should be removed since they are not needed to support rooftop equipment anymore.

The concrete appears to be carbonated to the face of reinforcing and contains chlorides in excess of the chloride corrosion threshold. In order to minimize future corrosion once the concrete repairs are complete, the building envelope needs to be properly, weather protected and the interior climate controlled to minimize moisture migrating to the reinforcing. If the structure is not kept climate controlled, the concrete should be treated with a corrosion inhibitor or an active (impressed current) cathodic protection system installed to protect the beams and the columns from an accelerated corrosion environment. The small lower roof addition is in poor condition and was not part of the original 1941 building. This addition will require a new roof and extensive masonry repair and possible underpinning. This addition should be considered for demolition, since it has less historical significance than the earlier constructed building.

OPINION OF PROBABLE CONSTRUCTION COST

Our opinion of the probable construction cost to complete the concrete repairs described in general above is Six Hundred Sixty One Thousand Nine Hundred Ninety Five and Seventy Three Cents ($661,995.73) and is broken down as follows.

DESCRIPTION:		QUANTITY		UNIT PRICE			TOTAL PRICE
COLUMN REPAIR		308	C.F.	600.00	$/C.F.		$184,800.00
BEAM REPAIR		204	C.F.	600.00	$/C.F.		$122,400.00
SLAB REPAIR	68 S.F. (.25)	170	C.F.	600.00	$/C.F.		$102,000.00
WALL REPAIR	80 S.F (.5)	40	C.F.	600.00	$/Ea.		$24,000.00
ANODES		723	Each	45.00	$/Each		$32,535.00
				SUBTOTAL		=	$465,735.00
GENERAL CONDITIONS	15%					=	**$69,860.25**
BONDS	3%					=	**$16,067.86**
TOTAL BUILDING						=	**$551,663.11**
CONTINGENCY	20%					**=**	**$110,332.62**
GRAND TOTAL						=	**$661,995.73**

This estimate does not include fees associated with engaging a qualified professional engineer to prepare bid documents and provide construction administration services.

CONCLUSIONS

In general, the structure is in fair condition with areas that are in poor condition and portions that should be demolished. There is a great deal of concrete repair required throughout the structure and a portion of the low roof requires restructuring. The concrete is carbonated to the face of reinforcing and contains chlorides in excess of the chloride corrosion threshold. Concrete deterioration will accelerate until the concrete is repaired and the reinforcing protected from carbonation and chloride attack.

It has been a pleasure serving you as a consulting structural engineer. Please contact our office if there are any questions regarding this correspondence, or if you need any additional information.

Very truly yours,
ATLANTIC ENGINEERING SERVICES OF JACKSONVILLE
FLORIDA CERTIFICATE OF AUTHORIZATION #791

Mark J. Keister, P.E.
Principal

MJK/drg

PHOTOGRAPH 1

PHOTOGRAPH 2

PHOTOGRAPH 3

PHOTOGRAPH 4

PHOTOGRAPH 5

PHOTOGRAPH 6

PHOTOGRAPH 7

PHOTOGRAPH 8

PHOTOGRAPH 9

PHOTOGRAPH 10

PHOTOGRAPH 11

PHOTOGRAPH 12

PHOTOGRAPH 13

PHOTOGRAPH 14

PHOTOGRAPH 15

PHOTOGRAPH 16

PHOTOGRAPH 17

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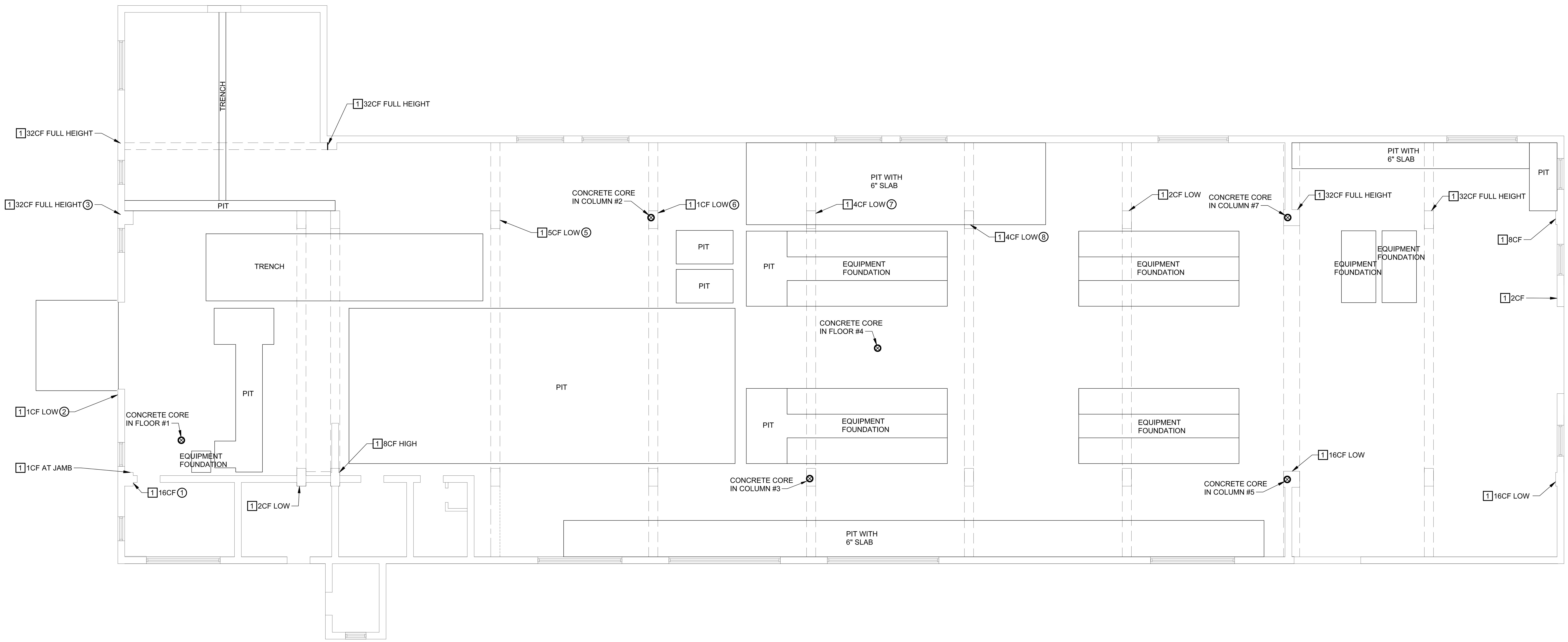
APPENDIX A

SURVEY PLANS



FOUNDATION AND FLOOR PLAN

SCALE: 1/8" = 1'-0"

SURVEY NOTES:

1 SPALLED COLUMN WITH EXPOSED CORRODING REINFORCING.
2 SPALLED BEAM WITH EXPOSED CORRODING REINFORCING.
3 SPALLED SLAB WITH EXPOSED CORRODING REINFORCING.
4 WALL SPALL WITH EXPOSED CORRODING REINFORCING.
CARBONATION TEST LOCATION.

WILLIAM P. HORN
ARCHITECT, P.A.

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BUILDING 103
TRUMAN WATERFRONT
KEY WEST, FLORIDA

SEAL
MARK J KEISTER PE 37435

DATE
12-04-14

REVISIONS

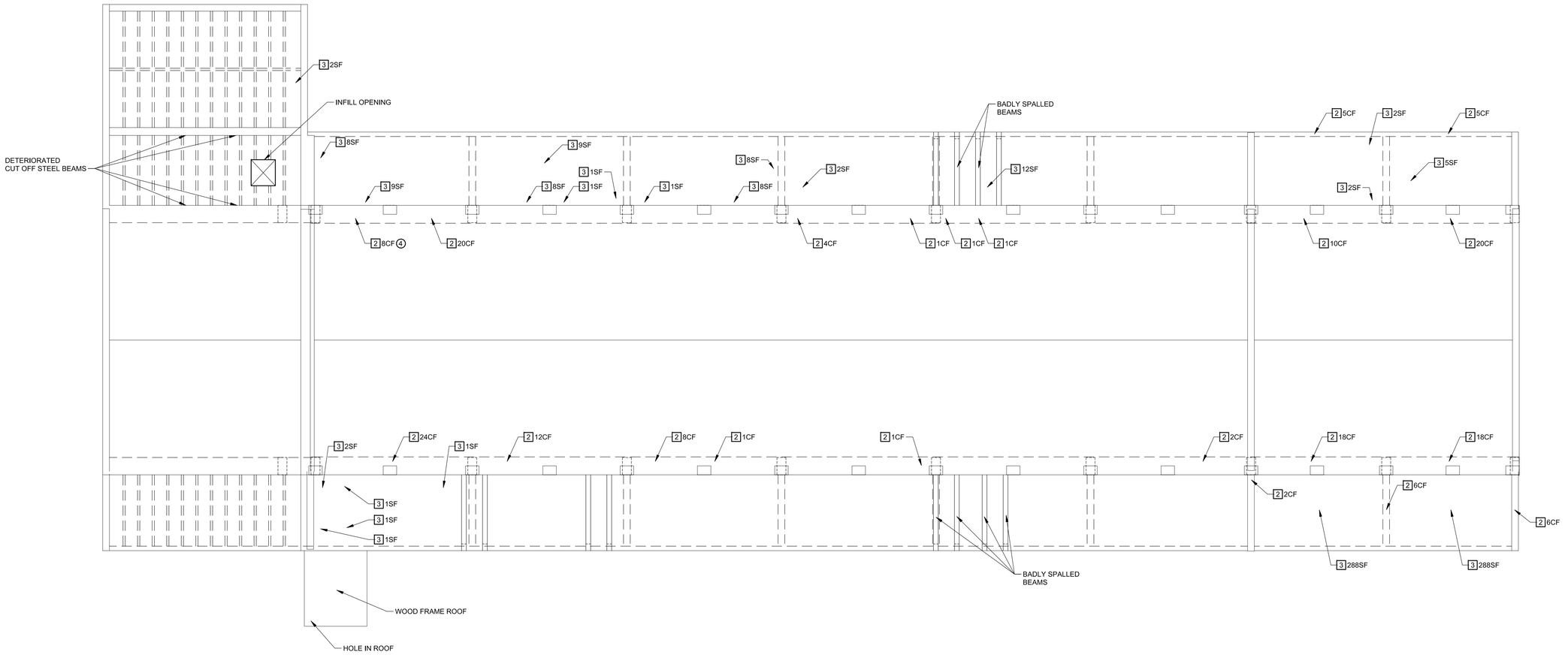
DRAWN BY
DCO

PROJECT NUMBER
1407

S1-1

BUILDING 103

TRUMAN WATERFRONT
KEY WEST, FLORIDA



LOW ROOF PLAN

SCALE: 1/8" = 1'-0"

SURVEY NOTES:

1 SPALLED COLUMN WITH EXPOSED CORRODING REINFORCING.

2 SPALLED BEAM WITH EXPOSED CORRODING REINFORCING.

3 SPALLED SLAB WITH EXPOSED CORRODING REINFORCING.

4 WALL SPALL WITH EXPOSED CORRODING REINFORCING.

Ⓟ CARBONATION TEST LOCATION.

BUILDING 103

TRUMAN WATERFRONT
KEY WEST, FLORIDA

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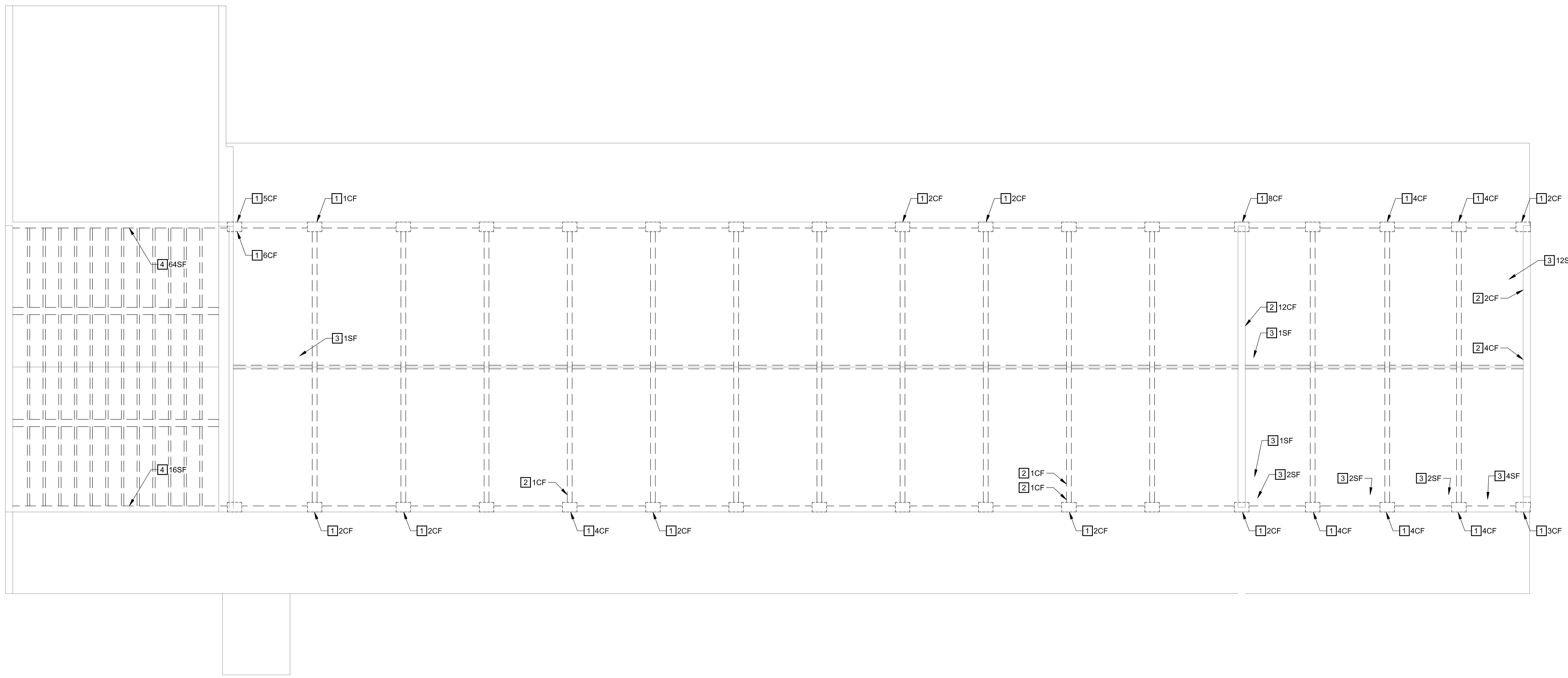


HIGH ROOF PLAN

SCALE: 1/8" = 1'-0"

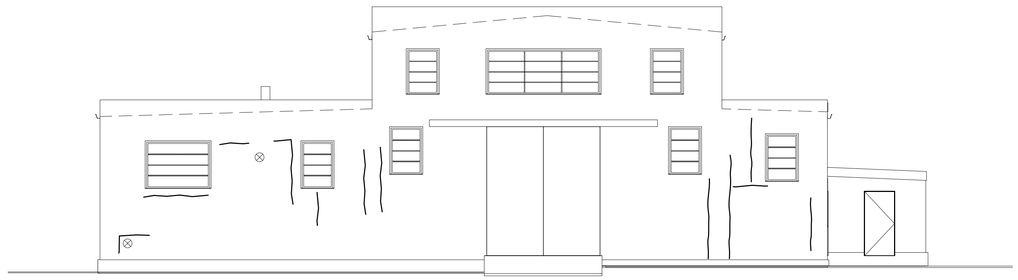
SURVEY NOTES:

1 SPALLED COLUMN WITH EXPOSED CORRODING REINFORCING.
2 SPALLED BEAM WITH EXPOSED CORRODING REINFORCING.
3 SPALLED SLAB WITH EXPOSED CORRODING REINFORCING.
4 WALL SPALL WITH EXPOSED CORRODING REINFORCING.
CARBONATION TEST LOCATION.

S1-3

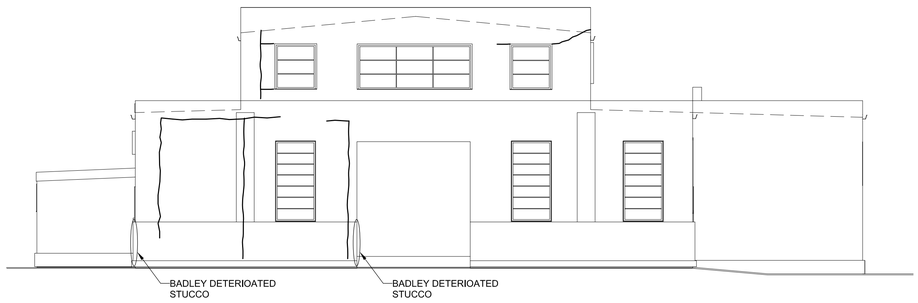
BUILDING 103

TRUMAN WATERFRONT
KEY WEST, FLORIDA



WEST ELEVATION

SCALE: 1/8" = 1'-0"
~~~ STUCCO CRACKS



EAST ELEVATION

SCALE: 1/8" = 1'-0"
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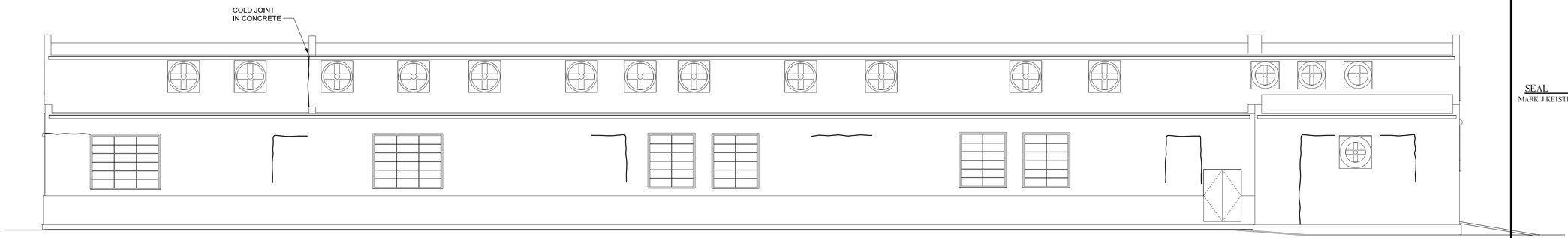

NORTH ELEVATION

SCALE: 1/8" = 1'-0"
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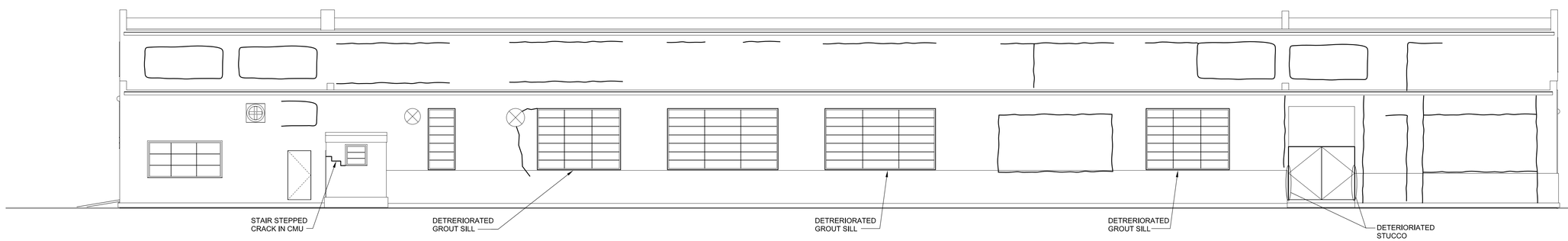

SOUTH ELEVATION

SCALE: 1/8" = 1'-0"
~~~ STUCCO CRACKS

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REVISIONS

DRAWN BY
DCO

PROJECT NUMBER
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S1-4

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APPENDIX B

TESTING LOCATIONS:
AES – DEPT OF CARBONATION
AMEC – CHLORIDE &COMPRESSION

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Depth of Carbonation

TEST LOCATION	PH at Depth
1.	7.5 at 2-1/2" deep
2.	9.5 at reinforcing 1-1/2" deep
3.	9.5 at reinforcing 1-1/2" deep
4.	7.5 at reinforcing 1-1/2" deep
5.	6.5 at reinforcing 2" deep
6.	9.0 at reinforcing 2" deep
7.	9.0 at reinforcing 2" deep
8.	9.0 at reinforcing 2" deep

REPORT OF ACID SOLUBLE CHLORIDE TESTING

PROJECT:	Building 103 Truman Waterfront Park, Key West, FL	PROJECT NO.:	6738-13-5286.03
CLIENT:	Atlantic Engineering Services	DATE TESTED:	November 7, 2014

As requested, AMEC E&I has completed testing of seven concrete cores received from Atlantic Engineering Services on October 28, 2014 . The samples were crushed and tested in general accordance with Florida Test Method FM 5-516. Results are outlined below.

Choride Content

Sample ID	% Cl	ppm
Core # 1	0.0099	98.9
Core # 3	0.1410	1410.3
Core # 4	0.1796	1796.2
Miami Core # 1	0.0508	507.6
Miami Core # 2	0.0725	724.7
Miami Core # 5	0.0629	629.2
Miami Core # 6	0.2466	2465.6

Respectfully submitted

Corey T. Chascin, E.I.

Report of Compression Test of Concrete

Client Name:	Mark Keister, P.E.	Report Date:	10/15/2014 & 10/16/2014
Project Name:	Truman Bldg, 103	Project Number:	6785.14.2647
Technician:	Teofilo Vaca Hector Orue-Capdevila		

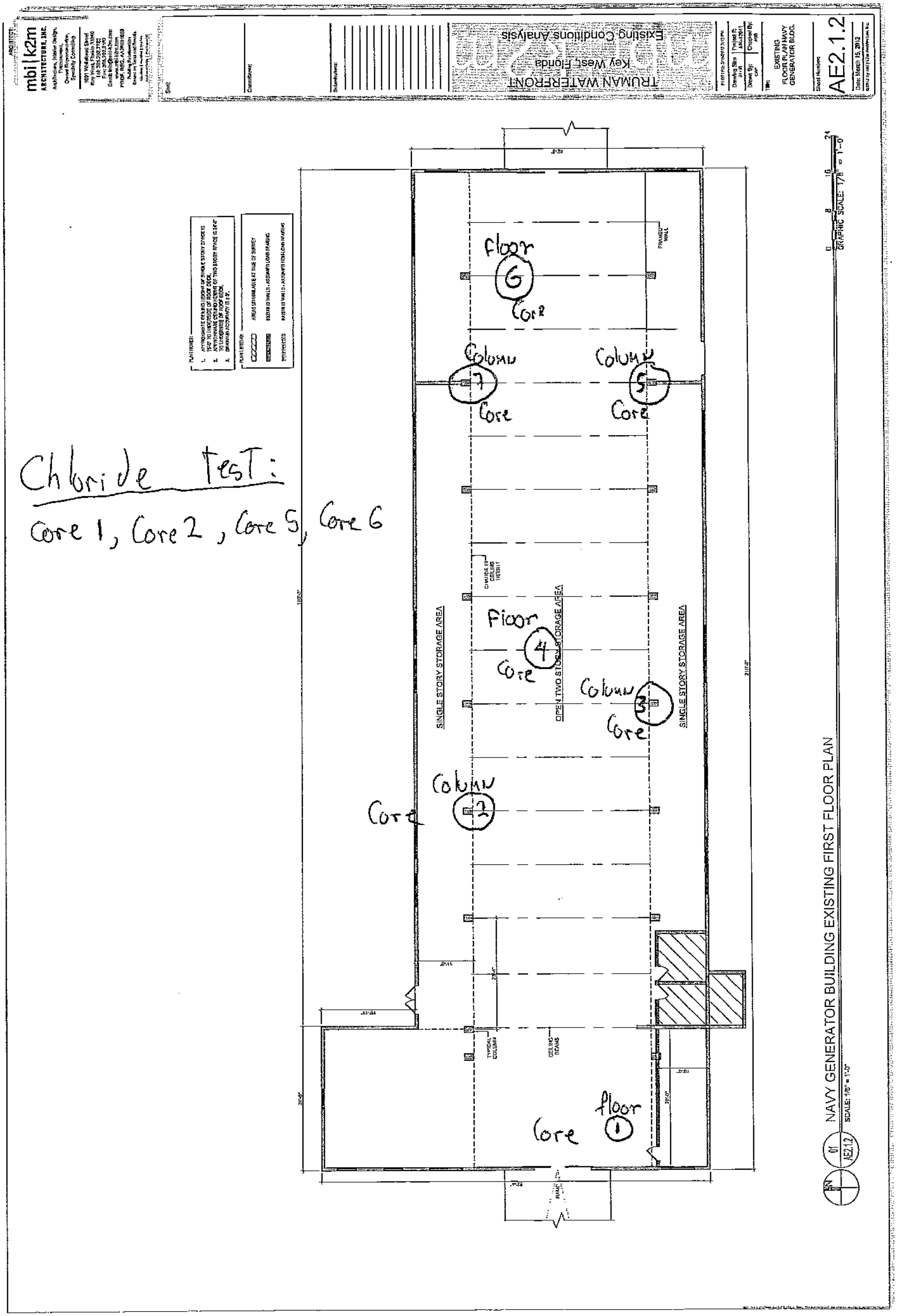
Test Method : In general accordance with ASTM C-39, C-42, C-174 and C-617

Location:	1	2	3	4	5	6	7
Location description	Floor Main Enter	Column	Column	Floor Center	Column	Floor Back	Column
Date Core Obtained	10.16.2014	10.16.2014	10.16.2014	10.16.2014	10.16.2014	10.16.2014	10.16.2014
Date Tested	10.23.2014	10.23.2014	10.23.2014	10.23.2014	10.23.2014	10.23.2014	10.23.2014
Diameter, Inches	3.71	2.76	3.76	2.73	2.76	2.76	2.76
Actual Core Length, Inches before Capping	5.65	5.51	5.49	5.45	5.44	4.82	5.34
After Capping	5.79	5.63	5.64	5.58	5.61	5	5.52
Area, Square Inches	10.81	5.98	5.98	5.98	5.98	5.98	5.98
Maximum Load, Lbs.	55453	14308	19807	27307	15350	24726	17241
Compressive Strength Load Area, PSI	5130	2390	3310	4570	2570	4130	2880
Corrected Strength	4920	2390	3310	4570	2570	4130	2880
Type of Fracture	2	2	2	2	2	2	2
L/D	1.56	2.04	2.04	2.02	2.03	1.81	2
Age of Specimen at test, Days	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Direction of Application of Load on the Specimen with Respect to Horizontal Plane of Concrete as Placed.	Vertical	Horizontal	Horizontal	Veritcal	Horizontal	Veritcal	Horizontal
Moisture Condition at tests	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Normal Maximum Size Aggregate, Inches	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"
Actual Drilled Length, Inches	5.65	5.51	5.49	5.45	5.44	5.98	5.98
Strength correction Factor	0.96	1	1	1	1	1	1

AMEC Environment Infrastructure, Inc.
5845 N.W. 158th Street
Miami Lakes, Florida 33014
Tel (305) 826-5588 I Fax (305) 826-1799

Chloride Test:

Core 1, Core 2, Core 5, Core 6



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APPENDIX C

DEFINITION OF TERMS ASSOCIATED WITH THE DURABILITY OF CONCRETE

DEFINITION OF TERMS ASSOCIATED WITH THE DURABILITY OF CONCRETE
(From ACI 201.1R-08)

1 CRACKING

Crack- A complete or incomplete separation, of either concrete or masonry, into two or more parts produced by breaking or fracturing.

1.1 *Checking*- Development of shallow cracks at closely spaced but irregular intervals on the surface of plaster, cement paste, mortar, or concrete (See also *cracks* and *crazing*).

1.2 *Craze cracks*- Fine random cracks or fissures in a surface of plaster, cement paste, mortar or concrete.
Crazing- The development of craze cracks; the pattern of craze cracks existing in a surface (See also *checking* and *cracks*).

1.3 *D-cracks*- A series of cracks in concrete near and roughly parallel to joints and edges.

1.4 *Diagonal crack*- In a flexural member, an inclined crack, caused by shear stress, usually at approximately 45 degrees to the axis; or a crack in a slab, not parallel to either the lateral or longitudinal directions.

1.5 *Hairline cracks*- Cracks in an exposed-to-view concrete surface having widths so small as to be barely perceptible.

1.6 *Longitudinal cracks*- A crack that develops parallel to the length of the member.

1.7 *Map cracking*- 1) Intersecting cracks that extend below the surface of hardened concrete; caused by shrinkage of the drying surface concrete that is restrained by concrete at greater depths where either little or no shrinkage occurs; vary in width from fine and barely visible to open and well defined; or 2) the chief symptom of a chemical reaction between alkalis in cement and mineral constituents in aggregate within hardened concrete; due to differential rate of volume change in different members of the concrete; cracking is usually random and on a fairly large scale and, in severe instances, the cracks may reach a width of 12.7 mm (0.50 in.) (See also *checking* and *crazing*; also known as *pattern cracking*).

1.8 *Pattern cracking*- Cracking on concrete surfaces in the form of a repeated sequence; resulting from a decrease in volume of the material near the surface, or an increase in volume of the material below the surface, or both (see *map cracking*).

1.9 *Plastic shrinkage cracking*- Cracking that occurs in the surface of fresh concrete soon after it is placed and while it is still plastic.

1.10 *Random cracks*- Uncontrolled cracks that develop at various directions away from the control joints.

1.11 *Shrinkage cracking*- Cracking of a structure or member due to failure in tension caused by external or internal restraints as reduction in moisture content develops, carbonation occurs, or both.

1.12 *Temperature cracking*- Cracking due to tensile failure, caused by temperature drop in members subjected to external restraints or by a temperature differential in members subjected to internal restraints.

1.13 *Transverse cracks*- Cracks that occur across the longer dimension of the member.

2 DISTRESS

Deterioration- 1) Physical manifestation of failure of a material (for example, cracking, delamination, flaking, pitting, scaling, spalling, and staining) caused by environmental or internal autogenous influences on rock and hardened concrete as well as other materials; or 2) Decomposition of material during either testing or exposure to service (See also *disintegration*).

2.1 *Chalking*- Formation of a loose powder resulting from the disintegration of the surface of concrete or an applied coating, such as cementitious coating.

2.2 *Curling*- The distortion of concrete member from its original shape such as the warping of a slab due to differences in temperature or moisture content in the zones adjacent to its opposite faces (See also *warping*).

2.3 *Deflection*- Movement of a point on a structure or structural element, usually measured as a linear displacement or as succession displacements transverse to a reference line or axis.

2.4 *Deformation*- A change in dimension or shape.

2.5 *Delamination*- A separation along a plane parallel to a surface, as in the case of a concrete slab, a horizontal splitting, cracking, or separation within a slab in a plane roughly parallel to, and generally near, the upper surface; found most frequently in bridge decks and caused by the corrosion of reinforcing steel or freezing or thawing; similar to spalling, scaling, or peeling except that delamination affects large areas and can often only be detected by non-destructive tests, such as tapping or chain dragging.

2.6 *Disintegration*- Reduction into small fragments and subsequently into particles (See also *deterioration*).

2.7 *Distortion*- See *Deformation.*

2.8 *Drummy area*- area where there is a hollow sound beneath a layer of concrete due to a delamination, poor consolidation, or void (See also *delamination*).

2.9 *Dusting*- The development of a powdered material at the surface of hardened concrete (See also *chalking*).

2.10 *Efflorescence*- A deposit of salts, usually white, formed on a surface, the substance having emerged in solution from within either concrete or masonry and subsequently been precipitated by a reaction, such as carbonation or evaporation.

2.11 *Exfoliation*- Disintegration occurring by peeling off in successive layers; swelling up, and opening into leaves or plates like a partly opened book.

2.12 *Exudation*- A liquid or viscous gel-like material discharged through a pore, crack, or opening in the surface of concrete.

2.13 *Joint deficiencies*- Expansion, contraction, and construction joints not functioning in intended service conditions.

- **2.13.1** *Joint spall*- A spall adjacent to a joint.
- **2.13.2** *Joint sealant failure*- Joints opened due to a cracked and/or debonded sealant.
- **2.13.3** *Joint leakage*- Liquid migrating through the joint.
- **2.13.4** *Joint fault*- Differential displacement of a portion of a structure along a joint.

2.14 *Leakage*- Contained material is migrating through the concrete member.

- **2.14.1** Leakage, liquid- Liquid is migrating through the concrete.
- **2.14.2** Leakage, gas- Gas is migrating through the concrete.

2.15 *Mortar flaking*- A form of scaling over course aggregate.

2.16 *Peeling*- A process in which thin flakes of mortar are broken away from a concrete surface, such as by deterioration or by adherence of surface mortar to forms as forms are removed.

2.17 *Pitting*- Development of relatively small cavities in a surface; in concrete, localized disintegration, such as a popout; localized corrosion evident as minute cavities on the surface.

2.18 *Popout*- The breaking away of small portions of a concrete surface due to localized internal pressure that leaves a shallow, typical conical, depression with a broken course aggregate at the bottom.

- **2.18.1** *Popouts, small*- Popouts leaving depressions up to 10 mm (0.4 in.) in diameter, or the equivalent.
- **2.18.2** *Popouts, medium*- Popouts leaving depressions between 10 and 50 mm (0.4 and 2 in.) in diameter.
- **2.18.3** *Popouts, large*- Popouts leaving depressions greater than 50 mm (2 in.) in diameter.

2.19 *Scaling*- Local flaking or peeling away of the near-surface portion of hardened concrete or mortar (See also *peeling* and *spalls*).

- **2.19.1** *Scaling, light*- Loss of surface mortar without exposure of coarse aggregate.
- **2.19.2** *Scaling, medium*- Loss of surface mortar 5 to 10 mm (0.2 to 0.4 in.) in depth and exposure of coarse aggregate.
- **2.19.3** *Scaling, severe*- Loss of surface mortar 5 to 10 mm (0.2 to 0.4 in.) in depth with some loss of mortar surrounding aggregate particles 10 to 20 mm (0.4 to 0.8 in.) in depth.
- **2.19.4** *Scaling, very severe*- Loss of coarse aggregate particles as well as surface mortar, generally to a depth greater than 20 mm (0.8 in.).

2.20 *Spall*- A fragment, usually in the shape of a flake, detached from a concrete member by a blow, by the action of weather, by pressure, by fire, or by expansion within the larger mass.

- **2.20.1** *Small spall*- A roughly circular depression not greater than 20 mm (0.8 in.) in depth and 150 mm (6 in.) in any dimension.
- **2.20.2** *Large spall*- May be roughly circular or oval or, in some cases, elongated, and is more than 20 mm (0.8 in.) in depth and 150 mm (6 in.) in greatest dimension.

2.21 *Warping*- Out-of-plane deformation of the corners, edges, and surface of a pavement, slab, or wall panel from its original shape (See also *curling*).

3 TEXTURAL FEATURES AND PHENOMENA RELATIVE TO THEIR DEVELOPMENT.

3.1 *Air void*- A space in cement paste, mortar, or concrete filled with air; an entrapped air void is characteristically 1 mm (0.04 in.) or greater in size and irregular in shape; entrained air void is typically between 10 µm and 1 mm (0.04 mil and 0.04 in.) in diameter and spherical or nearly so.

3.2 *Blistering*- the irregular raising of a thin layer at the surface of placed mortar or concrete during or soon after the completion of the finishing operation; also, bulging of the finish plaster coat as it separates and draws away from the base coat.

3.3 *Bugholes*- Small regular or irregular cavities, usually not exceeding 15 mm (0.6 in.) in diameter, resulting from entrapment of air bubbles at the surface of formed concrete during placement and consolidation (Also known as surface air voids).

3.4 *Cold joint*- A joint or discontinuity resulting from a delay in placement of sufficient duration to preclude intermingling and bonding of the material in two successive lifts of concrete, mortar, or the like.

3.5 *Cold-joint lines*- Visible lines on the surfaces of formed concrete indicating the presence of a cold joint where one layer of concrete had hardened before subsequent concrete was placed.

3.6 *Discoloration*- Departure of color from that which is normal or desired (See also *staining*).

3.7 *Honeycomb*- Voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse aggregate particles.

3.8 *Incrustation*- A crust or coating, generally hard, formed on the surface of concrete or masonry construction or on aggregate particles.

3.9 *Laitance*- A layer of weak material known as residue derived from cementitious material and aggregate fines either: 1) carried by bleeding to the surface or to the internal cavities of freshly placed concrete; or 2) separated from the concrete and deposited on the concrete surface or internal cavities during placement of concrete underwater.

3.10 *Sand pocket*- A zone in concrete or mortar containing fine aggregate with little or no cement material.

3.11 *Sand streak*- A streak of exposed fine aggregate in the surface of formed concrete, caused by bleeding.

3.12 *Segregation*- The differential concentration of the components of mixed concrete, aggregate, or the like, resulting in nonuniform proportions in the mass.

3.13 *Staining*- Discoloration by foreign matter.

3.14 *Stalactite*- A downward-pointing deposit formed as an accretion of mineral matter produced by evaporation of dripping liquid from the surface of concrete, commonly shaped like an icicle (See also *stalagmite*).

3.15 *Stalagmite*- An upward-pointing deposit formed as an accretion of mineral matter produced by evaporation of dripping liquid, projecting from the surface of rock or of concrete, commonly roughly conical in shape (See also *stalactite*).

3.16 *Stratification*- The separation of overwet or overvibrated concrete into horizontal layers with increasingly lighter material toward the top; water, laitance, mortar, and coarse aggregate tend to occupy successively lower positions in that order; a layered structure in concrete resulting from placing of successive batches that differ in appearance; occurrence in aggregate stockpiles of layers of differing grading or composition; a layered structure in a rock foundation.

ATLANTIC ENGINEERING SERVICES

APPENDIX D

EXISTING STRUCTURAL CONDITIONS EVALUATION CRITERIA

ATLANTIC ENGINEERING SERVICES

EXISTING STRUCTURAL CONDITIONS
EVALUATION CRITERIA

EXCELLENT	**Meets or exceeds current structural code requirements.** Capable of safely carrying proposed occupancies. No significant vibrations, cracking or deflections. No structural reinforcement or repairs required. Very minor, if any, maintenance required.
GOOD	**Meets current structural code requirements.** Capable of safely carrying proposed occupancies. Deflections, cracking, vibrations may be observable. No structural reinforcement required. Minor structural repairs required. Some significant maintenance repairs required.
FAIR	**Majority of structure meets structural code requirements.** Portions of structure are not capable of carrying proposed occupancies. Deflections, cracking, vibrations, structural distress is observable. Structural reinforcement required in limited portions of the structure. Structural repairs required generally. Many significant maintenance repairs required.
POOR	**Majority of structure does not meet structural code requirements.** Much of the building is not capable of carrying proposed occupancies. Deflections, cracking, vibrations, structural distress commonly observable throughout the structure. Major reinforcement or reconstruction of the structure is required. Major maintenance repairs are required.
EXTREMELY POOR	**Collapse of structure is imminent.** Structure exhibits significant deflections, cracking, vibrations, structural distress. Structure requires extensive reinforcement or reconstruction of impractical scope.

NOTE: Some parts of each definition may not apply.