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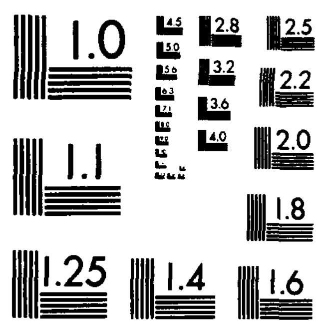

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STAGE I AND II

PLATFORM STRENGTH EVALUATION

OFFSHORE PANAMA CITY, FLORIDA

CONTRACT N62477-80-C-0194

BARNETT & CASBARIAN, INC.

Engineering & Marine Consultants
Marine Surveyors

9039 Katy Freeway
Suite 429
Houston, Texas 77024
Phone (713) 467-6713

1799 Stumpf Boulevard
Building 2, Suite 6
Gretna, Louisiana 70053
Phone (504) 361-1862

STAGE I AND II

PLATFORM STRENGTH EVALUATION

OFFSHORE PANAMA CITY, FLORIDA

CONTRACT N62477-80-C-0194

by

BARNETT & CASBARIAN, INC.

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February, 1981

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The U.S. Naval Facilities Engineering Command, Chesapeake Division, awarded Barnett & Casbarian, Inc. (BCI) Contract No. N62477-80-C-0194, to investigate two platforms operated by the U.S. Navy offshore Panama City, Florida. Platform Stage I is installed in 100 ft. of water approximately 12 miles (con't)

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offshore, and Stage II is installed in 60 ft. of water 2 miles offshore. Both platforms are approximately 25 years old.

The objective of this project was to inspect & determine the structural integrity of each platform as they presently exist. Based on this assessment, recommendations for the subsequent safe use of the structures would be developed.

If weak spots in the structure are discovered, recommendations for repair would be presented. The repair scheme would be economically feasible and compatible with the intended future use of the platforms. However, if the existing structures are found to be no longer safe, or uneconomical to be repaired, recommendations for disposal/salvage would be developed.

The structural analysis consisted of simulating the two platforms with present state of the art computerized structural analysis programs developed for offshore platform analysis.

The inspection program was developed based on the results of the structural analysis of the two platforms as originally constructed. This analysis consisted of simulating the two platforms with present state of the art computerized structural analysis programs for offshore platform analysis. Base on the available oceanographic data, it was determined that a storm with a 100 year return interval, accepted as a present day standard, would have wave loaded the deck. Hence the maximum wave height that could be utilized (wave crest elevation less than bottom of deck beams) was equivalent to a 20-year design storm. As a result of the analyses, several joints were selected for detailed subsea inspection.

The inspection program covered both the above and below water structural conditions of the two platforms. For the subsea inspection, a complete visual and video recorded coverage of the platform was performed. Biofouling measurements were conducted, cathodic potential measurements taken, and pitting and damaged members visually recorded. Also, several selected joints on each plat form were waterblasted and inspected in detail. Still photographs of the joints only recorded the observations.

Based on the results of the inspection program, changes were incorporated into the mathematically simulated platforms. These changes included the existing loading conditions, marine growth, reductions of wall thicknesses of underwater members due to corrosion loss, and deletion or revision of severely damaged members. This analysis represented the platforms in their existing conditions, and they were then subjected to survival storms with one and five year return intervals.

For both Stage I and II platforms, the inspection showed the structure below sea level to be in an advanced stage of deterioration. Many holes were observed in structural members, and heavy pitting was observed where biofouling was not present and allowed inspection. At the mudline, much debris existed which would provide a significant drain on the cathodic protection systems. Extensive chafing by wire rope has severely damaged many members, especially at the mudline of Stage I.

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EXECUTIVE SUMMARY

The U. S. Naval Facilities Engineering Command, Chesapeake Division, CHESNAVFACENGCOM, awarded Barnett & Casbarian, Inc., Contract N62477-80-C-0194, to investigate two platforms operated by the U. S. Navy offshore of Panama City, Florida. Platform Stage I is installed in 100 ft. of water approximately 12 miles offshore, and Stage II is installed in 60 ft. of water 2 miles offshore. Both platforms are approximately 25 years old.

The objective of this project was to inspect and determine the structural integrity of each platform as they presently exist. Based on this assessment, recommendations for the subsequent safe use of the structures would be developed.

If weak spots in the structure are discovered, recommendations for repair would be presented. The repair scheme would be economically feasible and compatible with the intended future use of the platforms. However, if the existing structures are found to be no longer safe, or uneconomical to be repaired, recommendations for disposal/salvage would be developed.

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These changes included the existing loading conditions, marine growth, reductions of wall thicknesses of underwater members due to corrosion loss, and deletion or revision of severely damaged members. This analysis represented the platforms in their existing conditions, and they were then subjected to survival storms with one and five year return intervals.

For both Stage I and II platforms, the inspection showed the structure below sea level to be in an advanced stage of deterioration. Many holes were observed in structural members, and heavy pitting was observed where biofouling was not present and allowed inspection. At the mudline, much debris existed which would provide a significant drain on the cathodic protection systems. Extensive chafing by wire rope has severely damaged many members, especially at the mudline of Stage I.

The selected joint inspections showed significant heavy pitting covering the members, weld, heat affected zone (HAZ), and some weld cracks. The cathodic potential (CP) measurements showed potentials inadequate for sufficient protection.

The conditions of the topside facilities were generally in poor condition with visible corrosion and deterioration on deck plating and structural members, with Stage I appearing the better maintained. The monel sheathing laminated on the members near the water line appeared to be protecting the steel, except where it had been drilled or removed.

The structural analysis conducted showed the platforms as they presently exist do not meet minimum margins of safety based on today's analysis standards, even for a five-year storm, as overstressing of members and joints occured.

The structures are probably capable of withstanding a one-year storm rating although there were some highly stressed or slightly overstressed joints even for this conditions. It should be noted that both one- and five-year storms are a very mild storm condition, and have a 100% and 20% chance of occurrence in a one-year period respectively.

The estimated cost to upgrade the platforms to withstand a five-year storm was investigated to illustrate the magnitude of costs involved. For Stage I, the cost was estimated to be $9,800,000 and for Stage II, $6,500,000.

The cost to salvage the structures was developed. If salvage takes place prior to the structures falling over, the cost of salvage was estimated to be $1,125,000. If salvage takes place after both structures have fallen over, the estimated cost would be $1,730,000, or approximately $600,000 more.

The estimated cost of a replacement platform for 100 ft. water depth (Stage I) is $5,300,000, including facilities.

RECOMMENDATIONS:

1. Based on our engineering analysis and inspection results, we recommend that a program to salvage the structures be initiated immediately.

2. If the structures are continued to be utilized until they deteriorate to a greater extent or fall over, then the following safety precautions should be strictly adhered to:

   a. Personnel should be allowed on the platforms during daylight hours and with a standby boat or helicopter always available for personnel evacuation.

   b. No personnel shall be allowed to remain on the platforms if sea conditions exceed 6-8 ft. waves.

   c. The platforms should be visually inspected after each storm with waves in excess of 10 ft., to determine if additional damage has been done, or at least once a year.

3. If continued use of a platform is justifiable, the most economical alternative is to replace one of the platforms with a new platform, designed and built under today's design standards and specifications.

STAGE I AND II, PLATFORM STRENGTH EVALUATIONS

OFFSHORE PANAMA CITY, FLORIDA

1.0. INTRODUCTION

The U. S. Naval Facilities Engineering Command, Chesapeake Division, CHESNAVFACENGCOM, awarded Barnett & Casbarian, Inc. (BCI) Contract N62477-80-C-0194, to evaluate the structural capability of two platforms, offshore Panama City, Florida.

A report "Phase A - Inspection Plan Review" was submitted in early November, 1980, and a meeting was held in Panama City, Florida, on November 24, 1980, to review the contents of the report. The inspection program was approved as submitted in the report. The on-site inspection of the platforms commenced on December 3, 1980, and was completed by December 9, 1980. A meeting was held in Panama City, Florida, on January 13, 1981, to discuss the results of the inspection program.

This report contains the final documentation of the inspection results, and the analysis of the structural capabilities of the platforms as they presently exist.

The platforms were designed in the early 1950's and installed in 1957. Stage I is a 16 pile platform installed in 100 ft. of water approximately 12 miles offshore. Stage II is a 9 pile platform installed in 60 ft. of water, 2 miles offshore Panama City, Florida.

1.1. OBJECTIVES

The objective of this study was to determine the structural integrity of each platform as they presently exist. Based on this assessment, recommendations for the subsequent safe use of the structures would be developed.

If there are weak spots in the structure, recommendations for repair would be presented. The repair scheme would be economically feasible and compatible with the intended future use of the platforms.

If, however, the existing structures are found to be no longer safe, or uneconomical to be repaired, recommendations for disposal/salvage would be developed.

1.2. SCOPE OF WORK

The scope of work is described in the U. S. Navy document dated April 17, 1980, and revised on July 11, 1980. This work covers the development of an inspection program based on an analysis of the as built conditions of the platforms. The report, "Phase A - Inspection Plan Review", referred to herein as the Phase A Report, covered the structural analysis of these platforms based on up-to-date technology, and developed an inspection program based on the analytical results.

The inspection program covered both the above- and below-water structural conditions of the two platforms. The results of this inspection are documented in this report.

Based on these results, structural integrity of the platforms as they presently exist are analyzed. The methods of structural analysis were described in the Phase A Report. The results of the analyses of the existing structures are presented in this Report and alternatives/recommendations for subsequent use of the platforms are discussed.

2.0. PLATFORM INSPECTION

The platform inspection program was presented in detail in the Phase A report. This section presents the inspection results of the topside and underwater portions of each platform.

2.1. STAGE I, PLATFORM INSPECTION

A. Above-Water Survey.

The condition of the topside facilities on Stage I is fair to poor, even though these have been better maintained than Stage II. The flight deck has miscellaneous equipment on deck, including cable drums, structural beams, trailers, mobile "cherry picker", etc., Fig. 2.1.1. The paint on the flight deck is deteriorating and where it has flaked off, general pitting corrosion is evident. This is particularly noticeable in low spots on the flight deck where water does not run off. Pits in some areas are 1-inch in diameter with depth up to ¼".

Within the flight deck instrument house, paint on the floor has completely deteriorated with general pitting corrosion throughout. Diesel fumes from the main deck fuel tank immediately below the instrument house are leaking into the instrument house. This can be potentially dangerous.

The outside walls of the building seem to be in reasonable condition with no signs of wave loading. Some minor damage outside the windows in the quarters section were visible, probably due to light debris and wind swept rain.

Within the building, the generator room decking is in fair to poor condition, with general pitting throughout. In some spots, corrosion has eaten all the way through the plating. All of the areas within the main deck are in the same fair to poor general condition, with the exception of the living quarters, which are in somewhat better shape. The equipment remaining on deck is shown in Dwgs. BCI-011 and 012. The weight of the equipment presently existing on the platform will be utilized in the structural analysis.

The deck beams supporting the main deck show rust and paint blisters at the junction of the flange and web, and also at the junction of the stiffeners and bottom flanges, Fig. 2.1.2. Undercut on welds and significant corrosion is visible at the stiffener plates in this figure.

The deck is supported by the piling extending through the jacket legs. The piling is shimmed and welded at the jacket/pile interface at the +14 ft. elevation.

At the +10 elevation of the jacket, general corrosion is apparent on all steel that is not covered by monel. Where the angle iron supporting the anode cables are bolted to the horizontal cross members, corrosion and corrosion products are visible, Fig. 2.1.3.

Figs. 2.1.4 through 2.1.11 show the condition of the jacket at the +10 ft. level. In some areas, when rust is chipped off, water comes out from behind the rust spots. These pitted areas have measured depths in excess of ¼".

The boat bumpers are in very poor shape, with heavy corrosion and deep pitting all over. Some of the timbers have fallen off the boat bumpers. The shims between the jacket and piling show some corrosion in spots. Paint has blistered in some areas, and where this is removed, and the corrosion products beneath also removed, pits in excess of ¼" were visible.

B. <u>Sub Sea Inspection</u>.

The inspection program for Stage I was discussed in detail in the Phase A Report. A complete visual and video recorded coverage of the platform was performed. Approximately twenty-four hours of video records with audio documentation of Stage I and II were gathered and are submitted under separate cover. The reference system utilized in the audio report has been defined in the Phase A Report and is shown on Drwg. BCI-001A. Drwgs. BCI-002A through 007A highlight the condition of the platforms, as perceived visually, and supplemented with the information from the detailed node inspection.

The jacket below sea level is in an advanced stage of deterioration. As expected, the amount of metal loss is greater in and close to the splash zone, reducing with depth and then increasing again towards the mudline. The measured cathodic potential at various locations throughout the structure using the Morgan Berkely hand held potentiometer indicated potentials between 600 and 675 millivolts. For a structure to be cathodically protected, a minimum of 800 millivolts is required. The structures were initially designed and installed with an impressed current system. This was replaced later with hanging anodes attached to wire cable, and lowered within the structure bays, as difficulties were experienced with the impressed current system. Unfortunately, the hanging anode system is susceptible to storm damage and has had to be replaced on a continuous basis. This on again/off again protection system can lead to selective as well as general corrosion, evidenced in the structure.

In addition, it can be seen in Drwgs. BCI-002A and BCI-003A, that the hanging anode wires within the structure have caused significant damage to the members due to wire chafing. Fig. 2.1.23 and Fig. 2.2.24 are good illustrations of the results of wire chafing on a member.

Levels 3 and 4 at elevations -86 ft. and -102 ft. in particular, show significant damage. As an example, on Drwg. BCI-003A, the member between nodes N3A3 and N3A3.5 has a hole 8" wide by 5' long! This is typical of what cable can do to tubular steel members. A hole presently in the making is on the horizontal member between node N3B1.5 and N3A5.5.

At the mudline, Level 4, a significant amount of debris exists, consisting of wire rope, clump weights (concrete) to anchor the anode cables, grafting and miscellaneous other trash that has accumulated over the years. A large amount of time was lost during the bottom survey because of this debris, since the divers' mobility was affected.

The most significant damage is at Level 4 of the structure and the diagonals between Level 4 and Level 3. Drwgs. BCI-006A and BCI-007A show several of these diagonals eaten away by corrosion/erosion.

It is interesting to note that the debris on the bottom is a significant drain on the cathodic protection system, and has most probably contributed to the general deterioration of the platform.

C. Selected Joint Inspections.

Seven joints were selected for detailed inspection, as described in the Phase A report. At each of these joints, the joint was water blasted clean to bare metal, approximately 3" on either side of the weld, the joint was visually inspected and still photographs taken of the worst quadrant. Thickness and pit depth measurements, cathodic potential (CP) readings and marine growth thickness measurements were taken. The results of these measurements and the visual description of the joint are included in Figs. 2.1.12 to 2.1.37. The format followed to present the results of the detailed inspection is to show a wide angled view of the joint in question, followed by close up views. A diagrammatic presentation showing the location of each joint precedes the photographic documentation. A 4" x 4" area on the main leg adjacent to the joint was also cleaned and inspected in detail. Results of these inspections are also documented in the Figures.

Unfortunately the ultrasonic thickness measurements taken varied significantly and can not be used to evaluate metal loss in the members. It was known that pitting on a surface will distort the data, but since the extent of deterioration at the joints was not known, these measurements were attempted.

2.2. STAGE II PLATFORM INSPECTION

A. Above Water Survey.

The condition of the topside facilities on Stage II is generally in poor condition. The flight deck has visible corrosion where the paint has peeled off, and this covers approximately 20% of the deck, Fig. 2.2.1. A fog-horn package, horizontal cylindrical tank and support beams for an overhead crane are on the flight deck. The upper deck is severely corroded, with heavy rust and pitting over 90% of the deck, Figs. 2.2.2 and

2.2.3. Within the repair shop, the floor plating is severely pitted in areas, Fig. 2.2.4.

Corrosion is visible on the deck beams supporting the main deck with some holes visible in the deck plating, Fig. 2.2.5. Drwgs. BCI-013 through 014 illustrate the lay out and existing equipment on the decks.

The deck is supported by the piles extending through the jacket legs. These piles are shimmed and welded to the jacket leg at the +14 ft. elevation.

The condition of the lower deck at the +12 ft. elevation is poor, in addition to the jacket legs above the splash zone. Figs. 2.2.6 to 2.2.10 visually present the condition of the jacket above MGL.

The boat bumpers are heavily corroded with some timber missing. As in Stage I, pits in excess of ¼" were visible where corrosion products were scraped off on the jacket legs. The monel-covered steel members in the splash zone and above have, at least outwardly, protected the steel adequately. However, the same problem as described for Stage I, viz., hanging of the anode cables, applies to Stage II as well.

B. Sub Sea Inspection.

A complete visual and video recorded coverage of the platform was performed. The video tapes with audio documentation for Stage II are submitted under separate cover. Drwgs. BCI-008A through BCI-010A highlight the condition of the platform as determined from the visual survey.

As with Stage I, this jacket below sea level is also in an advanced stage of deterioration. Damage from the hanging anodes is also evident from these drawings. At the Level 1 elevation, Drwg. BCI-008A, many holes in the horizontal members were evident; and where biofouling was not present, pitting was significant. Cable scars were quite evident on Level 2, but not as bad at the mud line as experienced at Stage I. The vertical diagonals between levels were also severely corroded with many holes, pitting up to ¼", and cable scars, Drwgs. BCI-009A and BCI-010A.

At the mud line, Level 3, a large amount of debris exists, consisting of wire rope, clump weights, rubber tires, timber and miscellaneous other trash that has accumulated over time.

A steel A-frame was discovered at the mud line adjacent to leg A1, and a pipeline or conduit to

Sea Lab, a few hundred feet away, was also discovered. As mentioned for Stage I, this debris on bottom, pipelines that are not insulated from the platform, etc., all provide a significant drain to the cathodic protection system of the platform, and most probably contributed to the general deterioration of the platform.

C. Selected Joint Inspection.

Five highly stressed joints were selected for detailed inspection. As for Stage I, the joints were visually inspected and still photographs taken of the worst quadrant. Thickness and pit depth measurements, as well as cathodic potential readings, were also taken.

The results of the inspection are shown in Figs. 2.2.11 through 2.2.41. In many cases, the diver was unable to visually detect any holes until after the node was cleaned. In one case, where the water blaster nozzle was pointed at a small hole in a member, the whole member leaked like a sieve for some distance away.

All the joints inspected had heavy pitting, covering the entire weld and HAZ, with several small holes scattered throughout. At node N2A2 and in the horizontal member to N3A3, a crack in the weld from 3 o'clock to 7 o'clock was visible. This was not evident until after the node was cleaned.

The CP measurements taken at these nodes varied between 650 and 700 millivolts, which is less than the minimum of 800 millivolts required for adequate protection. As a result of the rough surfaces due to pitting, the ultrasonic thickness measurements taken, fluctuated significantly and had to be discounted.

The thickness of biofouling measured varied between 1-inch at the mudline and 2 - 3-inches at the splash zone.

2.3. ANALYSIS OF DATA - STAGE I & II

To reduce the data obtained for analytical purposes, broad generalizations have to be made, tempered by experience and judgement. The obvious condition of a parted member is easily handled. The method of determining the structural properties of damaged but not parted members is discussed in Section 3.0. The metal loss due to general corrosion of the entire jacket below water is not so obvious, and had to be extrapolated, from the general visual examination of the structure and detailed joint inspection data. Drwg. BCI-007A shows a plot of metal loss with depth, developed from the data available for Stage I. This varies between 1/8" at the splash zone to 1/32" about mid-depth, and increasing to 3/32" at the mudline. A similar curve for Stage II is shown on Drwg. BCI-010A.

These curves have been utilized to reduce member thickness properties. These reduced properties are input into the program for the structural analysis of the platforms as they presently exist.

3.0. STRENGTH EVALUATION OF EXISTING PLATFORMS

Stage I and II platforms were re-evaluated for an assessment of their existing strength, based on information obtained from the inspection program, detailed in Section 2 of this report. In addition to this data, the load presently in existence on the platform was incorporated in the analysis. The revised analysis* is a statement of structural strength of platforms Stage I and II, for platforms in their existing configurations, with applied topside equipment loads and existing deck loads, resisting applied environmental loads.

3.0.1. Loading.

Gravity loading: Gravity loads consist of steel, equipment, consumables and buoyancy loads. Steel and buoyancy loads are computer-generated loads and are applied on the structural members corresponding to their input diameter and wall thickness.

Equipment loads represent a sizeable reduction (89%) in deck load compared to the design capacity of these decks.

*Computer programs utilized in the analyses are described in the Phase A report and are listed in the reference section.

This implies that appreciable deck live load in the form of storage material or heavy equipment is not anticipated to be used on the Stage I and II platforms in addition to the applied equipment loads. This does not mean that such additional loading may not be applied on decks. It does, however, require a careful evaluation of any heavy deck loading applied additionally on these decks, or applied simultaneously with storm loads, with due considerations for symmetry of applied storm directions.

Steel weights for the structure below the deck levels are computer-generated, and account for weight reduction due to corrosion and wear by determining the weights of input members, which are either reduced in size or deleted depending on the assessment of their condition observed during the Platform Inspection, as documented in Section 2 of this Report.

Steel weight for the deck structure was obtained from the furnished information on deck lifts for the Platforms (1200 kips Stage I and 684 kips Stage II), and was applied at appropriate nodes on the idealized deck structure in addition to under-deck loads above. Boat landing, fender and miscellaneous appurtenance loads were also hand-input on the structures as applicable.

In the cases of waveload, buoyancy forces are applied automatically in addition to wave forces on the submerged structure. It was estimated that 75% of the still-water buoyancy was lost in members intended to be buoyant, because of the large numbers of holes observed in existing submerged members. The loss of this buoyancy is compensated in the form of applied loads in the dead weight portion of the loads.

For the gravity condition, buoyancy forces are separately generated for the still-water dition. By adding these loads to the buoyancy compensating weights stated above, the still water load condition also represents realistic loading.

Storm loading: Combined wind, wave and current forces were applied on the structures (additional to still water loads), with mean still water line corresponding to mean low water plus astronomical and storm tide. One-year and five-year rated storms were applied on the structures from a South-West (270°) South (225°) and South East (180°) direction. These storm directions are consistent with those utilized in the Phase A Report.

One-year storms have a 100% probability of occurrence in one year's duration. They can approach from any direction, and the environmental conditions estimated for this storm rating are as follows (see Appendix A, Phase A Report):

Wave: 22 ft. height, 9 second period

Wind speed: 50 mph (Wind load 6.4 psf)

Current speed: 1 ft./second at surface
0.2 ft./second at mudline

Astronomical + Storm Tide

Stage I: 3.5 feet

Stage II: 3.5 feet

Five-year storms have a 20% probability of occurrence in one year's duration. They can approach from any direction, and the environmental conditions estimated for this storm rating are as follows:

Wave: 33 ft. height, 11 second period

Wind speed: 60 mph (Wind load 9.2 psf)

Current speed: 2 ft./second at surface
0.3 ft./second at mudline

Astronomical + Storm Tide

Stage I: 4.5 feet

Stage II: 4.5 feet

3.0.2. Member and Geometry Changes.

These changes are made to the mathematical models of the structures of Stage I and II Platforms, established for the purposes of analyzing the platforms as designed, in accordance with the Phase A Report. These changes are based on field observations made above and under water during the survey of these platforms conducted by BCI in December, 1980. The results of this survey are detailed in Section 2 of this Report. The geometry changes incorporated into the strength evaluation of existing platforms include the following:

(a) Assessment of marine growth on the platform: Observations of marine growth at the various levels of the Platform were generally similar to what was previously included in the Phase A analysis and hence were not changed.

(b) Reduction in wall thickness: Generalizations made on observed readings of material wastage due to corrosion are presented on BCI Drwgs. 001A through 010A of these Platform Surveys. The reductions in member wall thicknesses are incorporated into the sizes of the members used in the analysis.

(c) Reduction in member sizes: For the Stage I Platform, considerable wear due to wire rope and other debris caused uneven wear along a member exposed underwater. In regions of unusual deterioration some member properties were revised along specific lengths of such members, to downgrade their overall load-carrying capabilities to realistic levels.

(d) Deletion of members: Bent members, seriously damaged or worn-out members with successions of holes observed in them, or missing members, were taken out of the computer model used for analysis.

(e) Revision of pile description: For the lesser storms described in Section 3.0.1, the pile-head response is estimated to be linear against applied loads. Accordingly, the analysis of the as-built platforms is used to determine the points of contraflexure of the piles below the mudline. The piles are pinned at these locations, and are supported by lateral and vertical springs that each have a stiffness corresponding to the stiffness of each such support point in the as built analysis.

3.0.3. Analysis of Data.

Three dimensional analysis of the existing platforms is conducted by exposing the above computer idealized models of the existing Stage I and II Platforms to the environmental loads described in Section 3.0.1.

Overall analysis includes an evaluation of pilehead forces and moments.

Detailed analysis is performed to determine member capabilities to withstand applied loads, and to evaluate chord wall thicknesses to withstand punching shear forces, within prescribed margins of safety.

Symmetry of loading is considered in evaluating the members which are subjected to potential overstress for one-year and five-year environmental storms occurring from any direction.

3.1. STAGE I ANALYSIS

The specific analyses performed for Stage I are presented in this section. The general scope of the analysis was provided in Section 3.0.

3.1.1. Loading Conditions.

The general scope of loading includes the analysis of the gravity condition, the one-year storm (or 22 ft. wave) from 3 directions, and five year storm (or 33 ft. wave) from 3 directions. Each analysis consists of a combination of several separate loading conditions. The storm parameters are outlined in Section 3.0.1.

The separate loading conditions for the platform are as follows:

LOADING #	DESCRIPTION	FORCE SUMMATIONS Fx	Fy	Fz	Output Page #
1	270°, 22 ft. wave	0	546	-349	44
2	225°, 22 ft. wave	-249	540	-251	48
3	180°, 22 ft. wave	-347	544	0	52
4	270° wind (166 mph, 70.5 psf)	0	0	-140	54
5	180° wind (166 mph, 70.5 psf)	-134.5	0	0	56
6	Dead wt./steel/buoyancy correction loads	0	-2636	0	79
7	Equipment & consumable loads	0	-368	0	81
8	Still water (104' depth) buoyancy	0	451	0	97
9	270°, 33 ft. wave	0	549	-851	109
10	225°, 33 ft. wave	-597	556	-606	113
11	180°, 33 ft. wave	-842	567	0	117

Wind loads are factored down in combination loading to reflect 50 mph winds (6.4 psf) for 1 year, and 60 mph winds (9.2 psf) for the 5 year storm to compensate for the 166 mph wind load used in the separate load cases.

For the analysis of the platforms in their present condition, a reduction in deck loading was made from the design capacity loading allowed for in the as built analysis of Phase A (Table 3.1.1.0).

	STAGE I	STAGE II
As Built Design Capacity Live Loading	3,284 kips	1,654 kips
Estimated Present Live Loading	368 kips	203 kips

Table 3.1.1.0

Deck Loading

Loading combinations required for the analysis are as follows:

Loading Combination #	Loading Condition #	Description	Fx	Fy	Fz
1	12	270^{O}, 22' wave	0	-2457	-361
2	13	225^{O}, 22' wave	-257	-2464	-259
3	14	180^{O}, 22' wave	-359	-2460	0
4	15	Gravity	0	-2552	0
5	16	270^{O}, 33' wave	0	-2455	-869
6	17	225^{O}, 33' wave	-610	-2337	-619
7	18	180^{O}, 33' wave	-860	-2436	0

The loading combinations are presented on Pages 117 and 118 of the computer output.

3.1.2. Member and Geometry Changes.

(a) Deleted Members. The results of the inspection data are illustrated on Drwgs. BCI 002A through 007A. From this inspection data, a small number of members were found to be unacceptably deteriorated, bent, cracked or broken off to the extent where their loading capacity was reduced substantially. These members were removed from the Stage I idealized model used for the structural analysis. All the members except one were at levels 3 and 4. They are as follows:

Member Nos.	Location (in above-referenced BCI Drwgs.)
15HHB	Internal horizontal - Level "1"
63DHB	Main Horizontal - Level "3"
39DHB	" " " "
29DHB	" " " "
3DHB	" " " "
4DHB	" " " "
57DHB	Internal Horizontal - Level "3"
47DHB	" " " "
48DHB	" " " "
22DHB	" " " "
13DHB	" " " "
43DHB	" " " "
12CHB	Internal Horizontal - Level "4"
28CHB	Main Horizontal - Level "4"
69CHB	" " " "
2CHB	" " " "
4CHB	" " " "
3CVB	Diagonal - Face "A"
4CVB	" " "
8CVB	Diagonal - Face "B"
31CVB	Diagonal - Face "C"
11CVB	" " "
12CVB	" " "
13CVB	Diagonal - Face "D"
14CVB	" " "

Also, the cross-sectional properties of member 46CHB, a main horizontal member, level "4" were modified to account for a chafed hole in the member.

(b) Jacket Legs & Piling. Piling inside the jacket legs was assumed to be in an undeteriorated state as no inspection was made. The average platform member metal loss from pitting was .07 inches (approximately 1/16 of an inch), as shown on Drwg. BCI 006A. Therefore, a .07 inch reduction was applied to the jacket leg sleeve wall thicknesses below the mean low water level, with the exception of the area of monel coating in which the members are thought to generally be in good condition.

(c) Jacket Bracing. The average metal loss due to pitting was varied from depth to depth below the monel coated members as is shown on Drwg. BCI 006A. The following loss in thickness for both horizontal and diagonal brace members were extrapolated from the curve.

Member Location	Effective Corrosion Loss (In.)
Level X	0.10
Level X to Level 1	0.09
Level 1	0.08
Level 1 to Level 2	0.07
Level 2	0.05
Level 2 to Level 3	0.05
Level 3	0.05
Level 3 to Level 4	0.07
Level 4	0.08

Consequently, member properties were revised to reflect the effective metal loss in the jacket brace members.

(d) Piling Model. The structural piles were truncated at their points of contra-flexure. The spring constants are given in Table 3.1.2.0 and the pile foundation model is shown in Fig. 3.1.2.0. The survival storm output (Phase A) was used to determine the spring constants in the lateral and vertical direction in order to simulate the response of the piles.

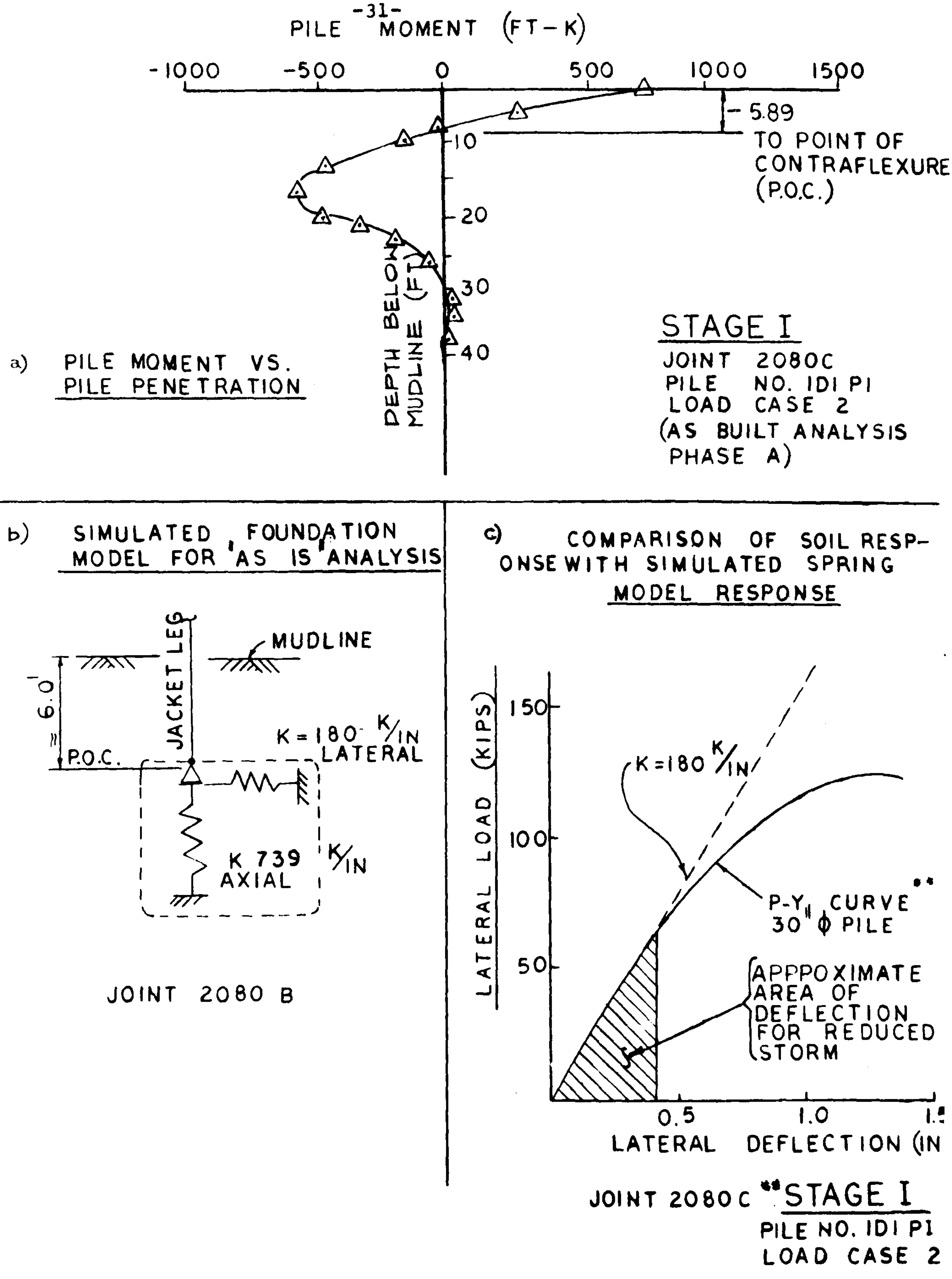
APPENDIX 1

Joint	Axial Spring (Kips/In.)	Lateral Spring (Kips/In.)
8020A	866	180
6020A	1232	"
4020A	796	"
2020A	588	"
8040A	1426	"
6040A	1290	"
4040A	1200	"
2040A	819	"
8060A	988	"
6060A	1150	"
4060A	692	"
2060A	779	"
8080A	634	"
6080A	740	"
4080A	580	"
2080A	739	"

The point of contraflexure was found to be at a depth of 6 ft. (average) below the mudline for all piles and this is where the pin joint with springs was located for the model.

Table 3.1.2.0

Pile Spring Constants



PILE FOUNDATION MODEL

FIG. 3.1.2.0

3.1.3. Analysis of Results.

The analysis was conducted to determine the structural integrity of the Stage I platform in its present condition and subjected to environmental loading for a 1-year storm represented by loading conitions 12, 13 and 14 and the five year storm represented by loading conditions 16, 17 and 18. The gravity condition is analyzed as condition 15. The analysis includes joint and member checks and the summary of the overstresses for all cases are presented in Tables 3.1.3.0 through 3.1.3.6. (two (2) copies of the output data are submitted under a separate cover).

The analysis of the data would indicate that the structure is capable of withstanding a 1-year storm, which has a 100% probability of occurrence in a one year period. However, for a 5-year storm, which has a 20% probability of occurence in a 5 year period, the structure had significant overstressing and would be incapable of withstanding such a storm without incurring stresses greater than within prescribed margins of safety.

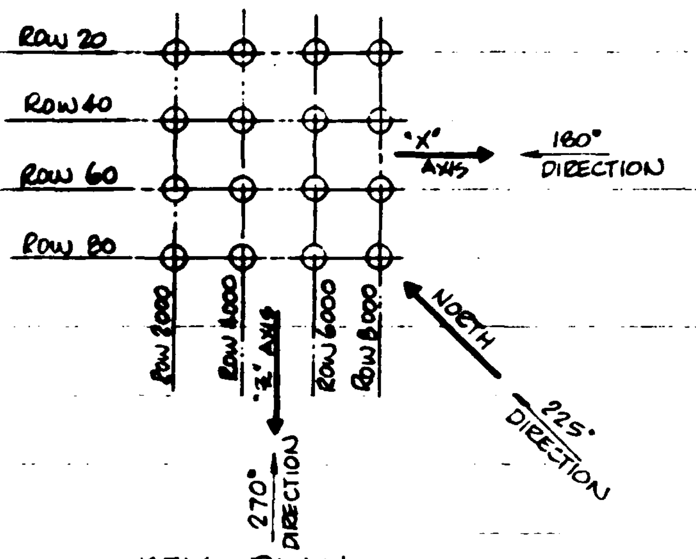
TABLE 3.1.3.0

DATEC, INC. STRESS ANALYSIS PROGRAM (UNITY)

TITLE BARNETT & CASBARIAN 16 PILE,STAGE 1 PANAMA CITY,FLA. 1236601 PR

SUMMARY OF ALLOWABLE STRESSES AND COMPUTED STRESSES FOR ALL OVER STRESSED MEMBERS

MEMB NO	MEMB TYPE	LOAD CASE	JT NO	DIST	K	KLY/RY	KLZ/RZ	CMY	CMZ	ALLOWABLE STRESS (KSI) FA	FBY	FBZ	TAU	COMPUTED STRESS (KSI) FA	FBY	FBZ	TAUY	TAUZ	SUM OF RATIOS	AISC EQ
560MB	12020	16	6020B	.0	.80	37.86	37.86	.85	.85	28.7	31.6	31.6	19.2	12.4	1.4	19.7	.9	.1	1.06*	161B
33CVB	12018	16	6020C	.0	.80	51.22	51.22	.85	.85	24.3	28.2	28.2	19.2	-18.3	.2	9.5	.2	.8	1.09*	161A
1FVB	12024	18	4080UM	47.4	.80	102.91	102.91	.82	.82	16.8	15.7	15.7	19.2	-11.1	1.1	7.6	.5	.0	1.15*	161A
3FVB	12024	18	4060N	47.4	.80	102.91	102.91	.83	.83	16.8	16.1	16.1	19.2	-10.8	1.1	7.6	.5	.0	1.12*	161B



KEY PLAN

MEMBER OVERSTRESS FOR 5-YR STORM

LOADING #16: 5 YEAR STORM IN 270° DIRECTION

LOADING #17: 5 YEAR STORM IN 225° DIRECTION

LOADING #18: 5 YEAR STORM IN 180° DIRECTION.

Table 3.1.3.0

TABLE 3.13.1

JATEC, INC.   PUNCHING SHEAR STRESS ANALYSIS OF TUBULAR JOINTS

TITLE BARNETT & CASBARIAN 16 PILE,STAGE 1   PANAMA CITY,FLA.   1236501   PR

. PUNCHING SHEAR ANALYSIS FOR RESIZED CHORDS

(THESE DESIRED SIZES > EXISTING SIZES)

STRESS FACTOR= 1.33

JOINT NO	LOAD CASE	BRACE MEMB NO	BRACE SIZE (IN) O.D.	BRACE SIZE (IN) WALL	ANGLE (DEG)	STRESS (KSI) FA/KA	STRESS (KSI) FB/KB	CHORD MEMB NO	YIELD (KSI)	CHORD SIZE (IN) O.D.	CHORD SIZE (IN) WALL	STRESS (KSI) FA	STRESS (KSI) FB	PUNCHING (KSI) ALLOW	PUNCHING (KSI) ACTUAL	F ACT/ F ALLOW
2080D	18	1DMB	14.000	.260	90.00	9.88	.36	D1CJJ	36.0	33.250	.555	-3.79	.11	6.14 K	4.80	.782
2080F	17	1FMB	10.750	.260	90.00	7.33	2.16	D1DJJ	36.0	33.250	.555	-1.27	2.03	6.43 K	4.45	.692
2080F	18	1FMB	10.750	.260	90.00	10.16	1.85	D1DJJ	36.0	33.250	.555	-2.21	.61	6.47 K	5.63	.869
4080C	16	13CMB	12.750	.170	90.00	.35	24.67*	D2CJJ	36.0	33.250	.555	.69	2.68	11.25 K	7.67	.682
4080F	17	2FMB	10.750	.260	90.00	7.41	3.91	D2DJJ	36.0	33.250	.555	-.13	1.70	8.08 K	5.30	.656
4080F	18	2FMB	10.750	.260	90.00	10.35	5.88	D2DJJ	36.0	33.250	.555	-.56	.27	8.38 K	7.60	.908
4080H	18	5MTX	10.750	.160	47.56	.89	12.11	D2FJJ	36.0	33.250	.555	-1.66	.85	5.63 K	3.68	.654
4080J	16	4MVX	10.750	.250	47.57	.60	8.95	D2JJJ	36.0	33.250	.555	-2.15	.80	5.64 K	4.23	.750
4080J	18	6MVX	10.750	.250	47.57	.62	10.32	D2JJJ	36.0	33.250	.555	-2.02	1.55	5.62 K	4.86	.864
6080C	16	22CMB	12.750	.170	90.00	.15	27.65*	D3CJJ	36.0	33.250	.555	.78	2.30	11.23 K	8.82	.739
6080F	18	19FMB	10.750	.260	90.00	9.65	3.02	D3DJJ	36.0	33.250	.555	-2.10	.33	7.14 K	5.93	.831
6080H	18	7MTX	10.750	.160	47.56	.47	12.76	D3FJJ	36.0	33.250	.555	-.27	.71	5.25 K	3.78	.719
6080J	18	8MVX	10.750	.250	47.57	.05	10.92	D3JJJ	36.0	33.250	.555	-.21	1.66	5.04 K	4.94	.978
6080J	16	9MTX	10.750	.250	47.57	.88	9.05	D3JJJ	36.0	33.250	.555	-2.15	.90	5.73 K	4.37	.763
6080J	17	9MTX	10.750	.250	47.57	4.56	7.34	D3JJJ	36.0	33.250	.555	-1.21	1.21	6.69 K	4.82	.722
8080D	18	20DMB	14.000	.260	90.00	10.03	2.63	D4CJJ	36.0	33.250	.555	.41	.59	7.40 K	5.93	.802
8080F	18	20FMB	10.750	.260	90.00	9.40	3.85	D4DJJ	36.0	33.250	.555	-.93	.20	7.74 K	6.28	.801
8080J	17	99JMB	10.750	.250	90.00	.26	16.03	D4JJJ	36.0	33.250	.555	-1.90	.19	11.06 K	7.34	.664
4080K	17	2YMB	10.750	.250	90.00	.74	9.17	D2HJJ	36.0	33.250	.555	-2.55	1.03	5.39 K	4.46	.828
2060D	18	30DMB	14.000	.260	90.00	10.36	1.09	C1CJJ	36.0	33.250	.555	-3.77	.74	6.47 K	5.34	.826
2060D	16	1DVX	10.750	.260	47.56	9.47	5.21	C1CJJ	36.0	33.250	.555	-2.93	12.39	8.94 K	5.71	.639
2060F	18	30FMB	10.750	.260	90.00	9.70	1.75	C1DJJ	36.0	33.250	.555	-2.14	.51	6.47 K	5.36	.829
4060D	16	30VX	10.750	.260	47.56	9.18	5.26	C2CJJ	36.0	33.250	.555	-2.65	11.50	9.33 K	5.64	.604
4060F	18	31FMB	10.750	.260	90.00	10.06	5.90	C2DJJ	36.0	33.250	.555	-.58	.31	8.39 K	7.47	.891
4060H	18	5MVX	10.750	.160	47.56	.73	12.11	C2FJJ	36.0	33.250	.555	-1.65	.81	5.58 K	3.85	.653
4060H	16	11MTX	10.750	.160	47.56	1.12	13.05*	C2FJJ	36.0	33.250	.555	.56	.51	5.45 K	4.00	.733
4060J	16	12MVX	10.750	.250	47.57	.23	10.88	C2JJJ	36.0	33.250	.555	1.50	1.59	5.15 K	4.98	.966
4060J	17	12MVX	10.750	.250	47.57	4.17	7.94	C2JJJ	36.0	33.250	.555	.04	1.34	6.81 K	4.97	.732
4060J	18	6MTX	10.750	.250	47.57	.72	10.25	C2JJJ	36.0	33.250	.555	-2.03	1.40	5.65 K	4.86	.860
6060D	16	50VX	10.750	.260	47.56	9.25	5.34	C3CJJ	36.0	33.250	.555	-2.97	12.66	9.10 K	5.70	.626
6060F	18	34FMB	10.750	.260	90.00	10.13	3.13	C3DJJ	36.0	33.250	.555	-2.37	.38	7.15 K	6.21	.870
6060H	18	7MVX	10.750	.160	47.56	.02	12.70	C3FJJ	36.0	33.250	.555	-.43	.74	5.08 K	3.67	.722
6060H	16	11MVX	10.750	.160	47.56	.46	13.10	C3FJJ	36.0	33.250	.555	.25	.53	5.22 K	3.88	.743
6060J	18	8MTX	10.750	.250	47.57	.23	10.83	C3JJJ	36.0	33.250	.555	-.18	1.54	5.14 K	4.96	.964
6060J	16	12MTX	10.750	.250	47.57	.65	10.98	C3JJJ	36.0	33.250	.555	1.34	1.72	5.33 K	5.16	.969
6060J	17	12MTX	10.750	.250	47.57	3.46	7.59	C3JJJ	36.0	33.250	.555	1.36	1.57	6.86 K	4.57	.666
8060D	18	35DMB	14.000	.260	90.00	10.46	2.66	C4CJJ	36.0	33.250	.555	.71	.55	7.58 K	6.15	.811
8060D	16	7DVX	10.750	.260	47.56	9.20	5.24	C4CJJ	36.0	33.250	.555	-2.76	12.80	8.95 K	5.64	.628
8060F	18	35FMB	10.750	.260	90.00	9.78	3.98	C4DJJ	36.0	33.250	.555	-.79	.12	7.75 K	6.45	.832
8060J	17	96JMB	10.750	.250	90.00	1.45	15.86	C4JJJ	36.0	33.250	.555	.23	1.33	11.20 K	7.80	.696
6060K	17	36XMB	10.750	.250	90.00	.66	8.20	C3HJJ	36.0	33.250	.555	1.29	.93	5.62 K	3.99	.711
2040D	16	36DMB	14.000	.260	90.00	.03	13.56	B1CJJ	36.0	33.500	.680	-.15	5.20	6.00 K	5.20	.866
2040D	17	36DMB	14.000	.260	90.00	6.75	9.49	B1CJJ	36.0	33.500	.680	-1.57	3.64	7.79 K	6.21	.802
2040D	18	36DMB	14.000	.260	90.00	9.60	.90	B1CJJ	36.0	33.250	.555	-3.36	.54	6.57 K	4.92	.748
2040F	16	36FMB	10.750	.260	90.00	8.73	2.03	B1DJJ	36.0	33.250	.555	-1.89	.43	6.65 K	5.06	.761

Table 3.1.3.1

TABLE 3.13.2

DATEC, INC. PUNCHING SHEAR STRESS ANALYSIS OF TUBULAR JOINTS

TITLE BARNETT & CASBARIAN 16 PILE, STAGE 1 PANAMA CITY, FLA. 1236601 PR

PUNCHING SHEAR ANALYSIS FOR RESIZED CHORDS

		BRACE						CHORD						STRESS FACTOR= 1.33			
JOINT NO	LOAD CASE	MEMB NO	SIZE (IN) O.D.	WALL	ANGLE (DEG)	STRESS (KSI) FA/KA	FB/KB	MEMB NO	YIELD (KSI)	SIZE (IN) O.D.	WALL	STRESS (KSI) FA	FB	PUNCHING (KSI) ALLOW		ACTUAL	F ACT/F ALLOW
2040F	16	100TX	10.750	.260	47.57	15.58	.81*	B1DJJ	36.0	33.250	.555	-.66	2.76	6.30	K	5.77	.909
2040F	17	100TX	10.750	.260	47.57	11.24	1.48	B1DJJ	36.0	33.250	.555	-1.27	1.88	6.51	K	4.58	.704
4040C	16	25CVB	14.000	.430	47.56	.99	5.33	B2CJJ	36.0	33.250	.555	-.31	3.02	5.89	K	4.69	.797
4040D	18	37DMB	14.000	.260	90.00	.42	8.15	B2CJJ	36.0	33.250	.555	-.97	3.31	5.84	K	4.02	.728
4040D	16	37DMB	14.000	.260	90.00	.63	20.26*	B2CJJ	36.0	34.000	.930	-.16	4.88	7.41	K	5.84	.788
4040D	17	37DMB	14.000	.260	90.00	2.86	12.50	B2CJJ	36.0	33.500	.680	-.17	4.94	7.33	K	5.90	.805
4040D	16	45DMB	14.000	.260	90.00	.50	17.38	B2CJJ	36.0	33.750	.805	-.19	5.67	6.95	K	5.78	.831
4040D	17	45DMB	14.000	.260	90.00	5.04	12.97	B2CJJ	36.0	33.500	.680	-.17	4.94	7.38	K	6.89	.933
4040F	18	37FMB	10.750	.260	90.00	9.10	5.72	B2DJJ	36.0	33.250	.555	-.83	.25	8.48	K	6.94	.819
4040H	18	17HVX	10.750	.160	47.56	.60	12.13	B2FJJ	36.0	33.250	.555	-1.77	.95	5.82	K	3.63	.656
4040H	16	15HTX	10.750	.160	47.56	1.98	12.39*	B2FJJ	36.0	33.250	.555	-1.99	.26	5.90	K	3.98	.675
4040J	16	16HVX	10.750	.250	47.57	1.42	10.20	B2HJJ	36.0	33.250	.555	-3.11	.43	5.99	K	5.07	.846
4040J	18	18HTX	10.750	.250	47.57	.59	10.30	B2HJJ	36.0	33.250	.555	-2.24	.54	5.64	K	4.83	.858
6040D	16	46DMB	14.000	.260	90.00	2.88	11.91	B3CJJ	36.0	33.500	.680	.73	6.73	6.84	K	5.66	.827
6040D	17	46DMB	14.000	.260	90.00	6.86	7.67	B3CJJ	36.0	33.250	.555	-.32	5.94	7.24	K	6.01	.948
6040D	18	54DMB	14.000	.260	90.00	2.92	9.25	B3CJJ	36.0	33.250	.555	.90	8.20	6.20	K	5.70	.920
6040D	17	54DMB	14.000	.260	90.00	4.56	8.31	B3CJJ	36.0	33.250	.555	-.32	5.94	6.91	K	6.03	.872
6040F	18	54FMB	10.750	.260	90.00	9.59	3.18	B3DJJ	36.0	33.250	.555	-2.09	.48	7.16	K	5.98	.835
6040F	16	14DTX	10.750	.260	47.57	14.70	.46	B3DJJ	36.0	33.250	.555	.09	2.98	6.12	K	5.30	.866
6040F	17	14DTX	10.750	.260	47.57	10.66	1.86	B3DJJ	36.0	33.250	.555	-.87	2.10	6.49	K	4.56	.702
6040H	16	15HVX	10.750	.160	47.56	1.97	12.71*	B3FJJ	36.0	33.250	.555	-2.20	.74	5.89	K	4.08	.693
6040H	18	19HVX	10.750	.160	47.56	.23	12.72	B3FJJ	36.0	33.250	.555	-.23	.93	5.18	K	3.72	.717
6040J	16	16HTX	10.750	.250	47.57	1.43	10.37	B3HJJ	36.0	33.250	.555	-3.57	.37	5.96	K	5.14	.864
6040J	17	16HTX	10.750	.250	47.57	4.92	8.03	B3HJJ	36.0	33.250	.555	-1.88	.42	7.21	K	5.25	.728
6040J	17	20HTX	10.750	.250	47.57	3.71	7.60	B3HJJ	36.0	33.250	.555	-1.88	.42	7.10	K	4.66	.656
6040J	18	20HTX	10.750	.250	47.57	.16	10.85	B3HJJ	36.0	33.250	.555	.38	.60	5.06	K	4.94	.976
8040D	18	55DMB	14.000	.260	90.00	10.07	2.53	B4CJJ	36.0	33.250	.555	.87	.49	7.45	K	5.90	.792
8040D	16	64DMB	12.750	.200	90.00	17.85	3.79*	B4CJJ	36.0	33.500	.680	.16	.25	8.47	K	6.36	.752
8040D	17	64DMB	12.750	.200	90.00	12.70	2.72	B4CJJ	36.0	33.250	.555	1.36	.20	7.18	K	5.56	.774
8040D	16	15DVX	10.750	.260	47.56	13.80	.57	B4CJJ	36.0	33.250	.555	.20	.30	6.27	K	5.04	.804
8040D	17	15DVX	10.750	.260	47.56	9.87	2.11	B4CJJ	36.0	33.250	.555	1.36	.20	6.57	K	4.40	.669
8040F	18	55FMB	10.750	.260	90.00	9.33	3.83	B4DJJ	36.0	33.250	.555	-.50	.10	7.76	K	6.16	.794
8040J	17	22HTX	10.750	.250	47.57	3.28	7.84	B4HJJ	36.0	33.250	.555	-2.81	.36	6.94	K	4.62	.665
8040J	18	22HTX	10.750	.250	47.57	.21	8.75	B4HJJ	36.0	33.250	.555	-1.27	.88	5.39	K	4.10	.761
20200	16	30DMB	12.750	.200	90.00	19.58	2.80*	A1CJJ	36.0	33.500	.680	-2.46	.32	7.64	K	6.58	.862
20200	17	30DMB	12.750	.200	90.00	13.96	2.50	A1CJJ	36.0	33.250	.555	-3.63	.23	6.59	K	5.93	.901
20200	18	65DMB	14.000	.260	90.00	9.03	1.01	A1CJJ	36.0	33.250	.555	-2.55	.46	6.61	K	4.71	.712
20200	16	9DTX	10.750	.260	47.56	15.65	.73*	A1CJJ	36.0	33.250	.555	-3.02	.39	6.28	K	5.75	.916
20200	17	9DTX	10.750	.260	47.56	11.25	1.22	A1CJJ	36.0	33.250	.555	-3.63	.23	6.37	K	4.46	.701
2020F	18	65FMB	10.750	.260	90.00	8.17	1.99	A1DJJ	36.0	33.250	.555	-1.19	.40	6.74	K	4.76	.707
40200	16	66DMB	14.000	.260	90.00	.41	12.59	A2CJJ	36.0	33.500	.680	-2.56	7.38	6.50	K	4.97	.765
40200	17	66DMB	14.000	.260	90.00	1.93	10.64	A2CJJ	36.0	33.250	.555	-2.11	6.49	6.61	K	5.89	.892
40200	16	67DMB	14.000	.260	90.00	.79	14.17	A2CJJ	36.0	33.500	.680	-2.56	7.38	6.78	K	5.89	.891
40200	17	67DMB	14.000	.260	90.00	3.91	9.27	A2CJJ	36.0	33.250	.555	-2.11	6.49	6.30	K	6.17	.981
4020F	18	66FMB	10.750	.260	90.00	8.40	5.62	A2DJJ	36.0	33.250	.555	-.25	.22	8.55	K	6.57	.769

Table 3.1.3.2

TABLE 3.1.3.3

DATEC, INC. PUNCHING SHEAR STRESS ANALYSIS OF TUBULAR JOINTS

TITLE BARNETT & CASBARIAN 16 PILE,STAGE 1 PANAMA CITY,FLA. 1236601 PR

TABLE 8. PUNCHING SHEAR ANALYSIS FOR RESIZED CHORDS

		B R A C E						C H O R D						STRESS FACTOR= 1.33		
JOINT NO	LOAD CASE	MEMB NO	SIZE (IN) O.D.	SIZE (IN) WALL	ANGLE (DEG)	STRESS (KSI) FA/KA	STRESS (KSI) FB/KB	MEMB NO	YIELD (KSI)	SIZE (IN) O.D.	SIZE (IN) WALL	STRESS (KSI) FA	STRESS (KSI) FB	PUNCHING (KSI) ALLOW	PUNCHING (KSI) ACTUAL	F ACT / F ALLOW
4020H	18	17HTX	10.750	.160	47.56	.68	12.13	A2FJJ	36.0	33.250	.555	-1.13	.90	5.57 K	3.64	.653
4020J	18	18HVX	10.750	.250	47.57	.54	10.24	A2HJJ	36.0	33.250	.555	-1.58	.53	5.58 K	4.79	.859
6020D	16	56DHB	12.750	.200	90.00	12.37	19.78*	A3CJJ	36.0	33.500	.600	-3.97	3.74	12.37 K	9.46	.764
6020D	17	56DHB	12.750	.200	90.00	9.02	13.95*	A3CJJ	36.0	33.250	.555	-4.30	3.65	11.01 K	8.20	.782
6020D	16	69DHB	14.000	.260	90.00	3.17	6.60	A3CJJ	36.0	33.250	.555	-4.89	4.68	6.82 K	4.58	.671
6020D	16	13DTX	10.750	.260	47.56	14.77	1.20	A3CJJ	36.0	33.250	.555	-4.89	4.68	6.60 K	5.67	.859
6020D	17	13DTX	10.750	.260	47.56	10.70	2.54	A3CJJ	36.0	33.250	.555	-4.30	3.65	6.78 K	4.89	.721
6020F	18	69FHB	10.750	.260	90.00	9.28	3.14	A3DJJ	36.0	33.250	.555	-1.69	.32	7.14 K	5.82	.815
6020H	18	19HTX	10.750	.160	47.56	.35	12.73	A3FJJ	36.0	33.250	.555	.13	.88	5.23 K	3.75	.717
6020J	17	20HVX	10.750	.250	47.57	3.17	7.34	A3HJJ	36.0	33.250	.555	1.25	.41	6.49 K	4.36	.671
6020J	16	20HVX	10.750	.250	47.57	.08	10.83	A3HJJ	36.0	33.250	.555	.71	.55	5.03 K	4.90	.974
8020D	16	78DHB	14.000	.260	90.00	.81	9.17	A4CJJ	36.0	33.250	.555	-3.07	7.32	6.20 K	4.67	.744
8020D	17	78DHB	14.000	.260	90.00	7.43	7.81	A4CJJ	36.0	33.250	.555	-1.08	5.22	7.58 K	7.14	.932
8020D	18	78DHB	14.000	.260	90.00	9.74	2.48	A4CJJ	36.0	33.250	.555	1.10	.47	7.37 K	5.69	.772
8020F	18	78FHB	10.750	.260	90.00	8.93	3.84	A4DJJ	36.0	33.250	.555	-.25	.18	7.74 K	5.98	.773
8020F	16	16DVX	10.750	.260	47.57	13.68	.22	A4DJJ	36.0	33.250	.555	-2.88	3.20	5.94 K	4.80	.809
8020F	17	16DVX	10.750	.260	47.57	9.71	1.71	A4DJJ	36.0	33.250	.555	-1.78	2.33	6.38 K	4.16	.651
8020J	18	22HVX	10.750	.250	47.57	.36	8.91	A4HJJ	36.0	33.250	.555	-.99	.64	5.42 K	4.13	.763
2070E	16	1DVX	10.750	.260	84.88	11.47	3.75	1DTX	36.0	10.750	.385	7.75	2.08	12.78 C	10.25	.807
2070E	17	1DVX	10.750	.260	84.88	8.79	3.59	1DTX	36.0	10.750	.323	6.70	2.17	11.24 C	9.95	.886
2070E	16	2DVX	10.750	.260	84.87	11.29	3.34	1DTX	36.0	10.750	.385	7.75	2.08	12.61 C	9.85	.781
2070E	17	2DVX	10.750	.260	84.87	8.68	3.16	1DTX	36.0	10.750	.323	6.70	2.17	11.14 C	9.92	.859
4070E	16	3DVX	10.750	.260	84.88	11.12	3.89	3DTX	36.0	10.750	.385	8.00	1.92	12.76 C	10.18	.792
4070E	17	3DVX	10.750	.260	84.88	8.25	3.26	3DTX	36.0	10.750	.323	6.74	2.18	11.21 C	9.25	.826
4070E	16	4DVX	10.750	.260	84.87	10.94	3.33	3DTX	36.0	10.750	.385	8.00	1.92	12.63 C	9.61	.761
4070E	17	4DVX	10.750	.260	84.87	8.13	3.02	3DTX	36.0	10.750	.323	6.74	2.18	11.16 C	8.96	.804
6070E	16	5DVX	10.750	.260	84.88	11.21	3.96	5DTX	36.0	10.750	.385	8.11	1.94	12.77 C	10.21	.800
6070E	17	5DVX	10.750	.260	84.88	8.02	3.35	5DTX	36.0	10.750	.323	6.58	1.88	11.23 C	9.14	.813
6070E	16	6DVX	10.750	.260	84.87	11.03	3.40	5DTX	36.0	10.750	.385	8.11	1.94	12.65 C	9.71	.768
6070E	17	6DVX	10.750	.260	84.87	7.90	2.71	5DTX	36.0	10.750	.323	6.58	1.88	11.08 C	8.52	.769
8070E	16	7DVX	10.750	.260	84.88	11.14	3.76	7DTX	36.0	10.750	.385	7.55	2.14	12.73 C	10.03	.788
8070E	17	7DVX	10.750	.260	84.88	7.23	2.84	7DTX	36.0	10.750	.323	6.08	1.99	11.20 C	8.10	.723
8070E	16	8DVX	10.750	.260	84.87	10.95	3.40	7DTX	36.0	10.750	.385	7.55	2.14	12.60 C	9.66	.763
8070E	17	8DVX	10.750	.260	84.87	7.11	2.62	7DTX	36.0	10.750	.323	6.08	1.99	11.19 C	7.82	.701
6030E	16	13DVX	10.750	.260	84.88	8.60	3.45	13DTX	36.0	10.750	.323	-14.50	.48	13.92 C	9.68	.696
8030E	16	15DVX	10.750	.260	84.88	16.67	1.91	15DTX	36.0	10.750	.385	-3.31	3.36	16.44 C	12.50	.760
8030E	17	15DVX	10.750	.260	84.88	11.91	2.08	15DTX	36.0	10.750	.323	-2.72	3.24	14.38 C	11.24	.781
8030E	16	16DVX	10.750	.260	84.87	16.46	.70	15DTX	36.0	10.750	.323	-3.93	3.94	13.98 C	13.78	.985
8030E	17	16DVX	10.750	.260	84.87	11.76	1.69	15DTX	36.0	10.750	.323	-2.72	3.24	14.32 C	10.80	.754
2070G	17	1FVX	10.750	.180	84.88	3.69	4.54	1FTX	36.0	10.750	.242	2.78	3.07	9.88 C	8.10	.818
2070G	17	2FVX	10.750	.180	84.87	3.68	4.25	1FTX	36.0	10.750	.242	2.78	3.07	9.65 C	5.88	.596
4070G	17	3FVX	10.750	.180	84.88	4.10	4.28	3FTX	36.0	10.750	.242	2.51	3.23	9.84 C	6.20	.631
4070G	17	4FVX	10.750	.180	84.87	4.09	4.10	3FTX	36.0	10.750	.242	2.51	3.23	9.85 C	6.03	.612
6070G	16	5FVX	10.750	.180	84.88	5.70	1.30	5FTX	36.0	10.750	.242	3.99	.70	8.69 C	5.18	.595
6070G	17	5FVX	10.750	.180	84.88	4.07	4.60	5FTX	36.0	10.750	.242	3.00	2.90	9.84 C	5.98	.607

Table 3.1.3.3

TABLE 3.13.4

GAIEC, INC. PUNCHING SHEAR STRESS ANALYSIS OF TUBULAR JOINTS

TITLE BARNETT & CASBARIAN 16 PILE,STAGE 1 PANAMA CITY,FLA. 1236671 PR

TABLE B. PUNCHING SHEAR ANALYSIS FOR RESIZED CHORDS

		B R A C E						C H O R D						STRESS FACTOR= 1.33			
JOINT NO	LOAD CASE	MEMB NO	SIZE (IN) O.D.	WALL	ANGLE (DEG)	STRESS (KSI) FA/HA	FB/HB	MEMB NO	YIELD (KSI)	SIZE (IN) O.D.	WALL	STRESS (KSI) FA	FB	PUNCHING (KSI) ALLOW		ACTUAL	F ACT / F ALLOW
20306	16	9FVX	10.750	.180	84.88	10.56	.43	9FTX	36.0	10.750	.242	-7.07	2.30	11.38	C	8.13	.714
20306	17	9FVX	10.750	.180	84.88	7.79	2.99	9FTX	36.0	10.750	.242	-5.05	2.60	11.90	C	7.98	.666
20306	16	10FVX	10.750	.180	84.87	10.28	.46	9FTX	36.0	10.750	.242	-7.07	2.30	11.40	C	7.94	.697
20306	17	10FVX	10.750	.180	84.87	7.56	3.00	9FTX	36.0	10.750	.242	-5.05	2.60	12.01	C	7.81	.651
60306	16	13FVX	10.750	.180	84.88	12.65	.34	13FTX	36.0	10.750	.242	-9.22	2.04	11.34	C	9.60	.847
60306	17	13FVX	10.750	.180	84.88	9.18	3.99	13FTX	36.0	10.750	.242	-6.47	3.53	12.06	C	9.75	.809
60306	16	14FVX	10.750	.180	84.87	12.37	.20	13FTX	36.0	10.750	.242	-9.22	2.04	11.31	C	9.29	.822
60306	17	14FVX	10.750	.180	84.87	8.97	3.95	13FTX	36.0	10.750	.242	-6.47	3.53	12.05	C	9.56	.793
80306	16	15FVX	10.750	.180	84.88	9.06	1.06	15FTX	36.0	10.750	.242	-8.40	1.10	11.56	C	7.98	.698
80306	17	15FVX	10.750	.180	84.88	6.11	4.42	15FTX	36.0	10.750	.242	-5.99	3.27	12.01	C	7.88	.649
80306	16	16FVX	10.750	.180	84.87	8.81	.29	15FTX	36.0	10.750	.242	-8.40	1.10	11.37	C	6.73	.592
80306	17	16FVX	10.750	.180	84.87	5.96	4.07	15FTX	36.0	10.750	.242	-5.99	3.27	12.04	C	7.42	.617
20701	16	1HVX	10.750	.160	84.87	4.90	3.48	25HTX	36.0	10.750	.223	2.06	2.95	8.84	C	6.02	.680
20701	17	1HVX	10.750	.160	84.87	3.17	4.46	25HTX	36.0	10.750	.223	1.31	2.61	9.13	C	5.48	.600
20701	16	25VX	10.750	.160	84.86	4.44	2.90	25HTX	36.0	10.750	.223	2.06	2.95	8.88	C	5.26	.598
80701	16	[illegible]	10.750	.160	84.87	4.81	3.38	27HTX	36.0	10.750	.223	2.09	2.87	8.84	C	5.87	.664
80701	16	27VX	10.750	.160	84.86	4.36	2.83	27HTX	36.0	10.750	.223	2.09	2.87	8.80	C	5.15	.586
50801	16	3HVX	10.750	.160	84.88	1.20	8.53	3HTX	36.0	10.750	.223	-1.24	6.28	8.76	C	7.00	.798
53801	17	3HVX	10.750	.160	84.88	6.85	7.54	3HTX	36.0	10.750	.223	-6.38	5.21	11.07	C	10.33	.933
53801	18	3HVX	10.750	.160	84.88	9.98	3.17	3HTX	36.0	10.750	.223	-8.07	3.70	11.10	C	9.43	.850
53801	16	4HVX	10.750	.160	84.87	1.09	8.84	3HTX	36.0	10.750	.223	-1.24	6.28	8.66	C	7.14	.824
50801	17	4HVX	10.750	.160	84.87	6.65	7.84	3HTX	36.0	10.750	.223	-6.38	5.21	11.00	C	10.48	.943
50801	18	4HVX	10.750	.160	84.87	9.49	3.42	3HTX	36.0	10.750	.223	-8.07	3.70	11.10	C	9.25	.833
40701	16	5HVX	10.750	.160	84.88	4.29	3.21	5HTX	36.0	10.750	.223	2.58	2.45	8.86	C	5.38	.607
40701	17	5HVX	10.753	.160	84.88	3.38	8.14	5HTX	36.0	10.750	.223	1.02	5.73	9.19	C	8.27	.901
40701	18	5HVX	10.750	.160	84.88	.95	10.30	5HTX	36.0	10.750	.223	-.83	7.61	8.51	C	8.09	.950
40701	17	6HVX	10.750	.160	84.87	3.16	8.16	5HTX	36.0	10.750	.223	1.02	5.73	9.18	C	8.14	.887
40701	18	6HVX	10.750	.160	84.87	1.13	10.49	5HTX	36.0	10.750	.223	-.83	7.61	8.60	C	8.35	.971
60701	16	7HVX	10.750	.160	84.88	4.86	3.22	7HTX	36.0	10.750	.223	2.84	2.42	8.81	C	5.79	.658
60701	17	7HVX	10.750	.160	84.88	3.45	7.25	7HTX	36.0	10.750	.223	2.55	5.50	9.27	C	7.69	.829
60701	18	7HVX	10.750	.160	84.88	.04	10.61	7HTX	36.0	10.750	.223	.36	7.84	8.38	C	7.66	.930
60701	16	8HVX	10.750	.160	84.87	4.46	2.63	7HTX	36.0	10.750	.223	2.84	2.42	8.74	C	5.08	.581
60701	17	8HVX	10.750	.160	84.87	3.14	7.30	7HTX	36.0	10.750	.223	2.55	5.50	9.26	C	7.56	.816
60701	18	8HVX	10.750	.160	84.87	.05	10.88	7HTX	36.0	10.750	.223	.36	7.84	8.09	C	7.87	.973
50601	16	11HVX	10.750	.160	84.88	.49	10.22	11HTX	36.0	10.750	.223	.93	7.57	8.50	C	7.70	.906
50601	17	11HVX	10.750	.160	84.88	8.18	7.60	11HTX	36.0	10.750	.285	-3.80	4.77	13.51	C	8.84	.654
50601	18	11HVX	10.750	.160	84.88	9.86	3.19	11HTX	36.0	10.750	.223	-7.90	3.73	11.10	C	9.35	.843
50601	16	12HVX	10.750	.160	84.87	.48	10.59	11HTX	36.0	10.750	.223	.93	7.57	8.49	C	7.96	.938
50601	17	12HVX	10.750	.160	84.87	7.86	8.11	11HTX	36.0	10.750	.285	-3.80	4.77	13.43	C	8.94	.666
50601	18	12HVX	10.750	.160	84.87	9.37	3.93	11HTX	36.0	10.750	.223	-7.90	3.73	11.11	C	9.18	.826
20301	17	13HVX	10.750	.160	84.88	5.13	4.81	13HTX	36.0	10.750	.223	-4.55	4.58	11.22	C	7.13	.636
20301	18	13HVX	10.750	.160	84.88	.19	8.04	13HTX	36.0	10.750	.223	.01	5.92	8.15	C	5.92	.727
20301	17	14HVX	10.750	.160	84.87	4.67	5.11	13HTX	36.0	10.750	.223	-4.55	4.58	11.12	C	7.02	.632
20301	18	14HVX	10.750	.160	84.87	.07	8.19	13HTX	36.0	10.750	.223	.01	5.92	7.97	C	5.95	.746
50401	16	15HVX	10.750	.160	84.88	2.46	10.15	15HTX	36.0	10.750	.285	-1.40	5.75	10.78	C	7.07	.656

Table 3.1.3.4

TABLE 3.1.3.5

GATEC, INC. PUNCHING SHEAR STRESS ANALYSIS OF TUBULAR JOINTS

TITLE BARNETT & CASBARIAN 16 PILE,STAGE 1 PANAMA CITY,FLA. 1236601 PR

TABLE 8. PUNCHING SHEAR ANALYSIS FOR RESIZED CHORDS

		B R A C E						C H O R D				STRESS FACTOR= 1.33					
JOINT NO	LOAD CASE	MEMB NO	SIZE (IN) O.D.	SIZE (IN) WALL	ANGLE (DEG)	STRESS (KSI) FA/KA	STRESS (KSI) FB/KB	MEMB NO	YIELD (KSI)	SIZE (IN) O.D.	SIZE (IN) WALL	STRESS (KSI) FA	STRESS (KSI) FB	PUNCHING (KSI) ALLOW		PUNCHING (KSI) ACTUAL	F ACT/ F ALLOW
5040I	17	15MVX	10.750	.160	84.88	5.19	7.46	15MTX	36.0	10.750	.223	-6.72	5.87	10.92	C	9.08	.831
5040I	18	15MVX	10.750	.160	84.88	9.78	2.99	15MTX	36.0	10.750	.223	-7.63	3.50	11.09	C	9.18	.828
5040I	16	16MVX	10.750	.160	84.87	2.62	10.29	15MTX	36.0	10.750	.208	-1.40	5.75	10.84	C	7.24	.668
5040I	17	16MVX	10.750	.160	84.87	4.78	7.49	15MTX	36.0	10.750	.223	-6.72	5.87	10.82	C	8.80	.814
5040I	18	16MVX	10.750	.160	84.87	9.30	3.25	15MTX	36.0	10.750	.223	-7.63	3.50	11.10	C	8.99	.810
4030I	17	17MVX	10.750	.160	84.88	4.23	6.34	17MTX	36.0	10.750	.223	-4.75	5.55	10.95	C	7.59	.693
4030I	18	17MVX	10.750	.160	84.88	.80	10.35	17MTX	36.0	10.750	.223	-.64	7.63	8.43	C	8.01	.950
4030I	17	18MVX	10.750	.160	84.87	3.77	6.48	17MTX	36.0	10.750	.223	-4.75	5.55	10.82	C	7.36	.681
4030I	18	18MVX	10.750	.160	84.87	.97	10.46	17MTX	36.0	10.750	.223	-.64	7.63	8.53	C	8.21	.963
6030I	16	19MVX	10.750	.160	84.88	6.62	1.11	19MTX	36.0	10.750	.223	-7.76	3.54	10.88	C	6.97	.641
6030I	17	19MVX	10.750	.160	84.88	6.39	7.41	19MTX	36.0	10.750	.223	-5.08	6.03	11.10	C	9.98	.892
6030I	18	19MVX	10.750	.160	84.88	.21	10.70	19MTX	36.0	10.750	.223	.26	7.89	8.24	C	7.84	.952
6030I	16	20MVX	10.750	.160	84.87	8.07	.75	19MTX	36.0	10.750	.223	-7.76	3.54	10.81	C	6.32	.585
6030I	17	20MVX	10.750	.160	84.87	5.98	7.54	19MTX	36.0	10.750	.223	-5.08	6.03	11.04	C	9.70	.879
6030I	18	20MVX	10.750	.160	84.87	.19	10.88	19MTX	36.0	10.750	.223	.26	7.89	8.23	C	7.96	.967
8030I	17	21MVX	10.750	.160	84.88	4.59	8.05	21MTX	36.0	10.750	.223	-4.57	6.03	10.71	C	9.08	.847
8030I	18	21MVX	10.750	.160	84.88	.75	8.99	21MTX	36.0	10.750	.223	-.35	6.62	8.52	C	7.00	.822
8030I	17	22MVX	10.750	.160	84.87	4.20	8.15	21MTX	36.0	10.750	.223	-4.57	6.03	10.60	C	8.93	.842
8030I	18	22MVX	10.750	.160	84.87	.63	9.14	21MTX	36.0	10.750	.223	-.35	6.62	8.41	C	7.02	.836
5020I	16	23MVX	10.750	.160	84.88	.91	7.79	23MTX	36.0	10.750	.223	1.56	5.56	8.92	C	6.25	.701
5020I	17	23MVX	10.750	.160	84.88	6.87	6.04	23MTX	36.0	10.750	.223	-3.64	5.45	11.27	C	9.26	.821
5020I	18	23MVX	10.750	.160	84.88	9.39	3.03	23MTX	36.0	10.750	.223	-6.94	3.54	11.10	C	8.91	.802
5020I	16	24MVX	10.750	.160	84.87	.64	8.03	23MTX	36.0	10.750	.223	1.56	5.56	8.65	C	6.23	.721
5020I	17	24MVX	10.750	.160	84.87	6.48	6.01	23MTX	36.0	10.750	.223	-3.64	5.45	11.22	C	9.23	.819
5020I	18	24MVX	10.750	.160	84.87	8.91	3.21	23MTX	36.0	10.750	.223	-6.94	3.54	11.11	C	8.69	.782

$FIN

Table 3.1.3.5

TABLE 3.13.6

DATEC, INC.   PUNCHING SHEAR STRESS ANALYSIS OF TUBULAR JOINTS

TITLE BARNETT & CASBARIAN 16 PILE,STAGE 1   PANAMA CITY,FLA.   1236801   PR

TABLE B. PUNCHING SHEAR ANALYSIS FOR RESIZED CHORDS

		BRACE						CHORD						STRESS FACTOR= 1.00		
JOINT NO	LOAD CASE	MEMB NO	SIZE (IN) O.D.	WALL	ANGLE (DEG)	STRESS (KSI) FA/KA	FB/KB	MEMB NO	YIELD (KSI)	SIZE (IN) O.D.	WALL	STRESS (KSI) FA	FB	PUNCHING (KSI) ALLOW	ACTUAL	F ACT/ F ALLOW
208BJ	15	89JM8	10.750	.250	90.00	.06	14.24	B1JJJ	36.0	33.250	.555	-1.09	.38	8.43 K	6.44	.764
808BJ	15	99JM8	10.750	.250	90.00	.02	14.20	D4JJJ	36.0	33.250	.555	-.78	.36	8.43 K	6.41	.760
206BJ	15	86JM6	10.750	.250	90.00	.00	14.17	C1JJJ	36.0	33.250	.555	-.99	.30	8.42 K	6.38	.758
[illegible]	15	[illegible]	10.750	.250	90.00	-.01	14.22	C4JJJ	36.0	33.250	[illegible]	-.83	.31	8.43 K	6.41	.760

STIN

Table 3.1.3.6

For the 1-year storm, one joint (No. 4040D) had punching shear overstressing occurring and several joints were in the 80% to 90% range. (It is noteworthy that a 1-year storm is a relatively minor storm.)

For the 5-year storm, 82 separate joints were observed to have punching shear stresses greater than the allowable values and 4 members have bending/axial stresses in excess of allowable values. The highest value observed for punching shear was a 289% value for joint No. 4040D for load #16, 180°, 33 ft. wave. Also, if you consider symmetrical loading, there are potentially 3 other joints overstressed to this magnitude.

It should be noted that storms of this magnitude can occur from all directions and that each joint and member overstress generally represents potential overstress in three additional symmetrically located members in the platform.

The following conclusions are presented based on the structural analysis:

(a) As was indicated by the Phase A analysis, the Stage I platform as originally designed and constructed will not withstand a 20-year storm (approximately a 40 ft. maximum wave height) within a prescribed margin of safety, and based on today's analysis standards.

(b) The platform in its present condition, and based on the results of the inspection program, can not withstand a 5-year storm loading within prescribed margins of safety.

(c) The platform is probably capable of withstanding a 1-year storm loading.

3.2. STAGE II ANALYSIS

Section 3.0 describes the scope of the analysis generally conducted for the Stage II Platform. The specific analyses performed for Stage II are presented in this section.

3.2.1. Loading Conditions.

As described in Section 3.0.1., the general scope of loading includes the analysis of the gravity condition, the one-year storm from 3 directions and the five-year storm from 3 directions. Each analysis comprises of a combination of several loading conditions. The one-year storm is referred to as a 22' wave condition. The five-year storm is called a 33' wave condition. The actual storm parameters are outlined in Section 3.0.1.

LOADING #	DESCRIPTION	FORCE SUMMATIONS			
		Fx	Fy	Fz	Output Page #
1	270°, 33 ft. wave	2^{k}	196^{k}	-554^{k}	44
2	225°, 33 ft. wave	-379^{k}	199^{k}	-390^{k}	48
3	180°, 33 ft. wave	-531^{k}	209^{k}	2^{k}	52
4	270°, 22 ft. wave	1^{k}	190^{k}	-236^{k}	77
5	225°, 22 ft. wave	-162^{k}	209^{k}	-167^{k}	81
6	180°, 22 ft. wave	-225^{k}	198^{k}	1^{k}	85
7	270° wind (166 mph, 70.5 psf)	0	0	-100^{k}	87
8	180° wind (166 mph, 70.5 psf	-133^{k}	0	0	89
9	Dead/steel/buoyancy correction loads	0	-1192^{k}	0	100
10	Equipment/consumable loads	0	-203^{k}	0	102
11	Still water (60' depth)	0	161^{k}	0	110

Wind loads are factored down in combinations to reflect 50 mph winds for 1 year, and 60 mph winds for 5-year storms to compensate for the 166 mph wind load used in the separate load cases. For the analysis of the platform in their present condition, a reduction in deck loading was made from the capacity loading allowed for in the as built analysis of Phase A (Table 3.1.1.0).

Loading combinations used in the analysis are as follows:

LOADING COMBINATION #	LOADING CONDITION #	DESCRIPTION	Fx	Fy	Fz
1	12	270°, 33' wave	2^k	-1199^k	-567^k
2	13	225°, 33' wave	-391^k	-1196^k	-399^k
3	14	180°, 33' wave	-548^k	-1186^k	2^k
4	15	270°, 22' wave	1^k	-1205^k	-245^k
5	16	225°, 22' wave	-170^k	-1186^k	-173^k
6	17	180°, 22' wave	-237^k	-1197^k	1^k
7	18	Gravity	0	-1234^k	0^k

These loading combinations are presented on page 110 of the computer printout.

3.2.2. Member and Geometry Changes.

(a) Deleted Members. In accordance with the inspection data obtained, the results of Stage II inspection were documented on Drwgs. BCI-008A through 010A for this project. From this inspection data, a small number of members were found to be unacceptably deteriorated, bent, cracked or broken off. These members were removed from the Stage II mathematical model used in the analysis. They are as follows:

MEMBER NOS.	LOCATION (In Above Referenced BCI Drawings)
24EHB	Main Horizontal, Level I
6EHB	Internal Horizontal, Level I
10DHB	Main Horizontal, Level II
28DHB & 35DHB	Internal Horizontals, Level II
5EVB	Diagonal, Row 1
9EVB & 9CVB	Diagonal, Row 2
6EVB	Diagonal, Row B
11DVB	Diagonal, Row C

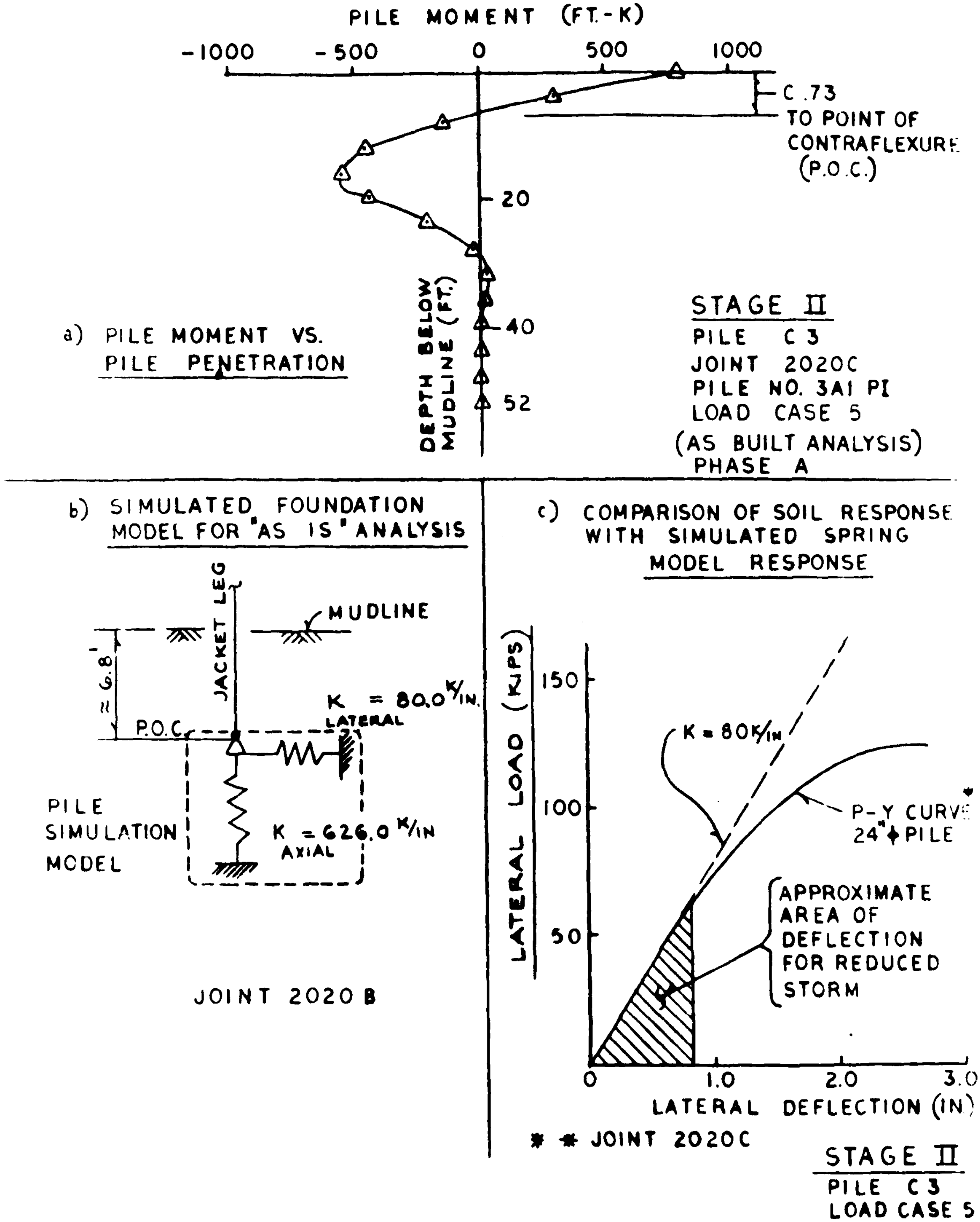
(b) Jacket Legs and Piling. Piling inside the jacket legs was assumed to be undeteriorated. Average platform pitting was 3/32", (effective metal loss over each member), and therefore a 0.1 inch reduction was applied on all jacket leg sleeves, reducing their wall thickness generally from 0.5" to 0.4".

(c) Jacket Bracing. The shallow depth of water associated with the Stage II platform, and the symmetrical nature of the curve showing "average depth of pitting due to corrosion" on Drwg. BCI-010A, indicate that it is justifiable to reduce all jacket bracing wall thickness by the average pitting value of 0.1" (3/32"). Consequently, new member properties were devised reflecting the pitting loss.

(d) Piling Model. In accordance with Fig. 3.2.2.0 and "Table of Spring Constants" (Table 3.2.2.0) attached, the structural piles were cut off at their points of contraflexure, and the survival storm output was utilized in determining the spring constants of supporting springs in the lateral and vertical directions. The point of contraflexure (P.O.C.) averaged 6.8 ft. below the mudline for the eight 24" ∅ and 7.6 ft. below the mudline for the 28" ∅ pile.

JOINT	AXIAL SPRING (kip/in.)	LATERAL SPRING (kip/in.)
2080B	842.0	80.0
5080B	1063.0	"
8080B	1558.0	"
2050B	869.0	"
5050B	1314.0	107.0
8050B	587.0	80.0
2020B	626.0	"
5020B	859.0	"
8020B	817.0	"

Table 3.2.2.0
Spring Constants



PILE FOUNDATION MODEL

FIG. 3.2.2.0

3.2.3. Analysis of Results.

The analysis of the structural integrity of the Stage II platform as it presently exists and subjected to a one year and five year storm has been presented. Two copies of the output data are submitted under separate cover.

The analysis of the data would indicate that the structure is capable of withstanding a 1-year storm, which has a 100% probability of occurrence in a 1-year period. For a 5-year storm, which has a 20% probability of occurrence in a 1-year period of time, the structure is significantly overstressed.

Even under the one year storm, large punching shear stress ratios were observed. For example, joint No. 5080D, member 2DHB, under loading combination #17 (180^o - 1 yr. storm), has a punching shear stress ratio of 88.2% of design capacity. For a five year storm rating, the same joint is subject to stresses exceeding 200% of its design capacity.

If we consider symmetry, four such joints would be subjected potentially to the same overstress.

Tables 3.2.3.0 through 3.2.3.2 show member and joint overstress for the Stage II platform, for a 5-year wave. If we assume that such a storm can occur from all directions (not unreasonable for these storm conditions) then each joint and member overstress generally represents potential overstress in three additional symmetrically located members on the platform.

The following conclusions based on our analysis are presented:

(a) From the Phase A analysis, the structure as originally designed and constructed, will not withstand a 20 year storm (approximately 40 ft. maximum wave height) within prescribed margins of safety, and based on today's analysis standards.

(b) Based on the results of the inspection program, and utilizing a 5 year storm wave, the structure can not withstand a storm of such magnitude.

(c) The structure is probably capable of withstanding a one year storm rating.

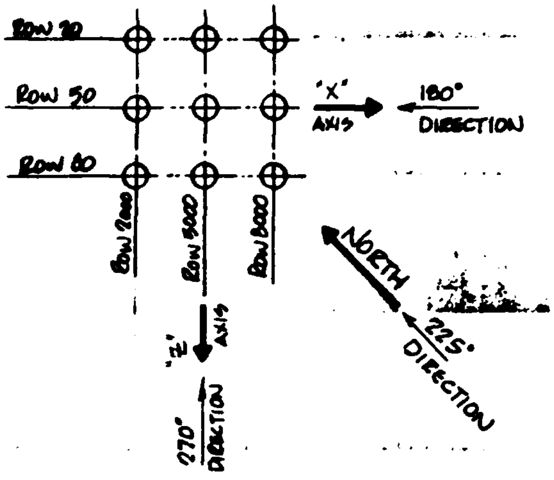
TABLE 3.2.3.0

DATEC, INC. STRESS ANALYSIS PROGRAM (UNITY)

TITLE BARNETT AND CASBARIAN - 9 PILE. PANAMA CITY , FLA 123ь001

TABLE E. SUMMARY OF ALLOWABLE STRESSES AND COMPUTED STRESSES FOR ALL OVER STRESSED MEMBERS

MEMB NO	MEMB TYPE	LOAD CASE	JT NO	DIST	K	KLY/RY	KLZ/RZ	CMY	CMZ	ALLOWABLE STRESS (KSI) FA	FBY	FBZ	TAU	COMPUTED STRESS (KSI) FA	FBY	FBZ	TAUY	TAUZ	SUM OF RATIOS	AISC EQ	
13CMB	10015	12	5080C	15.0	.80	38.42	38.42	.85	.85	25.7	32.4	32.4	19.2	-17.4	.1	18.9	.8	.0	1.26*	161A	
20MB	10015	14	50800	15.0	.80	38.42	38.42	.85	.85	28.7	31.6	31.6	19.2	29.7	1.8	7.7	.4	.1	1.28*	161B	
220MB	10015	14	50500	15.0	.80	38.42	38.42	.85	.85	28.7	31.6	31.6	19.2	21.6	.4	9.3	.8	.0	1.05*	161B	
300MB	10015	14	65500	15.0	.80	38.42	38.42	.85	.85	25.7	30.7	30.7	19.2	-23.6	4.0	2.3	.0	.2	1.07*	161A	
400MB	10015	12	80500	15.0	.80	38.42	38.42	.85	.85	28.7	31.6	31.6	19.2	21.9	6.2	5.8	.3	.3	1.03*	161B	
440MB	10015	14	80200	15.0	.80	38.42	38.42	.85	.85	25.7	31.3	31.3	19.2	-21.4	3.8	4.9	.2	.2	1.03*	161A	
510MB	10015	14	20800	.0	.80	19.21	19.21	.85	.85	28.7	31.6	31.6	19.2	26.9	3.4	.6	.2	.2	1.05*	161B	
520MB	10015	14	35800	7.5	.80	19.21	19.21	.85	.85	28.7	31.6	31.6	19.2	26.9	3.1	2.9	.0	.2	1.07*	161B	
6CVB	12027	14	50500	38.0	.80	82.70	82.70	.83	.83	20.0	16.1	16.1	19.2	-16.8	.5	8.1	.4	.0	1.35*	161A	
7CVB	12027	12	20500	38.0	.80	82.70	82.70	.84	.84	20.0	17.0	17.0	19.2	-16.0	1.4	7.2	.4	.0	1.23*	161A	
10CVB	12027	12	80500	38.0	.80	82.70	82.70	.83	.83	20.0	16.7	16.7	19.2	-16.3	1.6	7.7	.4	.0	1.29*	161A	
11CVB	12027	14	50200	38.0	.80	82.70	82.70	.85	.85	20.0	20.1	20.1	19.2	-13.3	1.7	7.3	.4	.0	1.04*	161A	
10VB	12015	14	5080E	38.0	.80	81.90	81.90	.79	.79	20.1	.0	.0	19.2	-20.9	.8	13.3	.9	.0	*******	161A	(AXIAL OVERSTRESS)
60VB	12015	14	5050E	38.0	.80	81.90	81.90	.85	.85	20.1	18.8	18.8	19.2	-14.7	.2	12.4	.9	.0	1.39*	161A	
70VB	12015	12	2050E	38.0	.80	81.90	81.90	.85	.85	20.1	21.3	21.3	19.2	-12.6	1.2	14.0	.9	.0	1.29*	161A	
90VB	12015	12	5050E	38.0	.80	81.90	81.90	.84	.84	20.1	17.1	17.1	19.2	-16.2	.4	12.7	.9	.0	1.54*	161A	
100VB	12015	12	8050E	38.0	.80	81.90	81.90	.85	.85	20.1	18.0	18.0	19.2	-15.4	1.3	13.3	.9	.0	1.51*	161A	
10EVB	12015	12	8050F	38.0	.80	81.89	81.89	.84	.84	20.1	17.4	17.4	19.2	-15.9	.5	15.5	1.2	.0	1.68*	161A	
11EVB	12015	14	5020F	38.0	.80	81.89	81.89	.85	.85	20.1	22.9	22.9	19.2	-11.8	.9	15.7	1.2	.0	1.25*	161A	



KEY PLAN

MEMBER OVERSTRESS for 5-YR. STORM

LOADING # 12 : 5-YEAR STORM IN 270° DIRECTION
LOADING # 13 : 5-YEAR STORM IN 225° DIRECTION
LOADING # 14 : 5-YEAR STORM IN 180° DIRECTION

Table 3.2.3.0

LATEC, INC.   PUNCHING SHEAR STRESS ANALYSIS OF TUBULAR JOINTS

TITLE BARNETT AND CASBARIAN - 9 PILE.   PANAMA CITY , FLA   1236D01

TABLE 8. PUNCHING SHEAR ANALYSIS FOR RESIZED CHORDS

DESIGNED SIZES \ EXISTING SIZES

		BRACE							CHORD						STRESS FACTOR= 1.33		
JOINT NO	LOAD CASE	MEMB NO	SIZE (IN) O.D.	SIZE (IN) WALL	ANGLE (DEG)	STRESS (KSI) FA/KA	STRESS (KSI) FB/KB	MEMB NO	YIELD (KSI)	SIZE (IN) O.D.	SIZE (IN) WALL	STRESS (KSI) FA	STRESS (KSI) FB	PUNCHING (KSI) ALLOW		PUNCHING (KSI) ACTUAL	F ACT/ F ALLOW
2080C	14	1CVB	12.750	.275	52.12	10.53	3.60	C1CJJ	36.0	26.250	.525	-2.82	8.86	9.19	K	6.24	.679
2080C	12	2CVB	12.750	.275	52.12	13.06	4.19*	C1CJJ	36.0	26.250	.525	-.04	9.16	9.09	K	7.60	.836
2080D	13	51DHB	10.750	.150	89.99	21.57	4.51*	C1CJJ	36.0	26.500	.650	-1.23	2.47	8.17	K	6.02	.737
2080D	14	51DHB	10.750	.150	89.99	26.85	3.49*	C1CJJ	36.0	26.500	.650	-2.23	2.58	8.06	K	7.00	.869
2080D	12	62DHB	10.750	.150	89.99	17.61	5.10*	C1CJJ	36.0	26.250	.525	.01	2.31	8.26	K	6.49	.785
2080D	13	62DHB	10.750	.150	89.99	13.75	8.33*	C1CJJ	36.0	26.250	.525	-1.53	3.07	8.86	K	6.31	.712
2080E	12	62EHB	10.750	.150	89.99	14.38	6.60*	C1DJJ	36.0	26.250	.525	-.37	.68	8.52	K	5.99	.704
2080E	13	62EHB	10.750	.150	89.99	10.83	10.65*	C1DJJ	36.0	26.250	.525	-.53	1.52	9.71	K	6.14	.632
5080C	12	13CHB	10.750	.150	90.00	17.36	18.87*	C2CJJ	36.0	26.250	.525	-.35	9.31	11.77	K	10.35	.879
5080C	13	13CHB	10.750	.150	90.00	14.31	15.29*	C2CJJ	36.0	26.250	.525	-.65	9.23	11.50	K	8.46	.736
5080C	12	4CVB	12.750	.275	52.12	17.58	4.57*	C2CJJ	36.0	26.500	.650	-.28	7.48	10.39	K	7.80	.751
5080C	13	4CVB	12.750	.275	52.12	13.46	3.62*	C2CJJ	36.0	26.250	.525	-.65	9.23	8.60	K	7.46	.867
5080D	13	2DHB	10.750	.150	90.00	20.28	5.25*	C2CJJ	36.0	26.250	.525	-.59	4.06	8.61	K	7.29	.848
5080D	14	2DHB	10.750	.150	90.00	29.68	7.88*	C2CJJ	36.0	26.500	.650	-1.05	4.15	9.71	K	8.67	.892
5080D	12	13DHB	10.750	.150	90.00	16.72	5.91*	C2CJJ	36.0	26.250	.525	-.30	1.49	9.13	K	6.46	.708
5080D	14	1CVB	12.750	.275	52.12	10.57	6.05*	C2CJJ	36.0	26.250	.525	-1.31	5.16	10.39	K	7.54	.725
5080D	14	3CVB	12.750	.275	52.12	10.26	6.37*	C2CJJ	36.0	26.250	.525	-1.31	5.16	10.14	K	7.57	.747
5080E	14	10EHB	10.750	.150	90.00	14.02	6.71*	C2DJJ	36.0	26.250	.525	-.76	3.28	8.69	K	5.92	.681
5080E	13	1DVB	12.750	.150	52.12	14.82	8.64*	C2DJJ	36.0	26.250	.525	-.59	2.95	9.10	K	5.81	.638
5080E	14	1DVB	12.750	.150	52.12	18.10	9.80*	C2DJJ	36.0	26.250	.525	-.76	3.28	10.42	K	6.88	.661
8080C	14	3CVB	12.750	.275	52.12	10.29	6.61*	C3CJJ	36.0	26.250	.525	-.29	7.46	10.25	K	7.72	.753
8080C	12	5CVB	12.750	.275	52.12	13.11	4.51*	C3CJJ	36.0	26.250	.525	-.68	9.28	9.25	K	7.79	.841
8080D	12	66DHB	10.750	.150	89.99	19.42	6.45*	C3CJJ	36.0	26.250	.525	-.62	1.88	8.08	K	7.39	.914
8080D	13	66DHB	10.750	.150	89.99	15.59	3.86	C3CJJ	36.0	26.250	.525	.22	2.37	7.85	K	5.56	.708
2050C	13	6CVB	12.750	.275	52.12	10.93	2.87	B1CJJ	36.0	26.250	.525	-2.18	9.27	8.46	K	6.03	.712
2050C	14	6CVB	12.750	.275	52.12	14.55	3.67*	B1CJJ	36.0	26.250	.525	-2.39	8.96	8.78	K	7.94	.904
2050D	12	24DHB	10.750	.150	90.00	22.13	7.02*	B1CJJ	36.0	26.250	.525	-1.38	2.27	8.66	K	8.33	.962
2050D	13	24DHB	10.750	.150	90.00	16.81	6.97*	B1CJJ	36.0	26.250	.525	-2.13	2.08	9.46	K	6.79	.718
2050D	13	55DHB	10.750	.150	89.99	14.87	5.79*	B1CJJ	36.0	26.250	.525	-2.13	2.08	8.25	K	5.90	.715
2050D	14	55DHB	10.750	.150	89.99	19.57	4.14*	B1CJJ	36.0	26.250	.525	-2.34	1.45	7.90	K	6.78	.857
2050C	12	59DHB	10.750	.150	89.99	23.54	2.94*	B1CJJ	36.0	26.500	.650	-1.11	1.82	7.89	K	6.11	.774
2050D	13	59DHB	10.750	.150	89.99	16.54	2.64	B1CJJ	36.0	26.250	.525	-2.13	2.08	7.51	K	5.48	.729
2050D	12	2CVB	12.750	.275	52.12	13.03	4.41*	B1CJJ	36.0	26.250	.525	-1.38	2.27	9.11	K	7.69	.845
2050D	13	2CVB	12.750	.275	52.12	9.49	3.86	B1CJJ	36.0	26.250	.525	-2.13	2.08	8.60	K	5.94	.691
2050D	12	7CVB	12.750	.275	52.12	13.84	5.38*	B1CJJ	36.0	26.250	.525	-1.38	2.27	9.41	K	8.54	.908
2050D	13	7CVB	12.750	.275	52.12	10.14	4.24	B1CJJ	36.0	26.250	.525	-2.13	2.08	9.33	K	6.42	.688
2050E	12	59EHB	10.750	.150	89.99	16.71	4.95*	B1DJJ	36.0	26.250	.525	-1.13	.97	8.64	K	6.19	.716
5050C	12	12CHB	10.750	.150	90.00	18.33	8.44*	B2CJJ	36.0	30.250	.525	-3.00	6.43	8.91	K	7.65	.859
5050C	13	12CHB	10.750	.150	90.00	13.50	5.43	B2CJJ	36.0	30.250	.525	-2.66	6.69	8.13	K	5.41	.666
5050C	13	22CHB	10.750	.150	90.00	10.87	14.03*	B2CJJ	36.0	30.250	.525	-2.66	6.69	10.46	K	7.11	.680
5050C	14	22CHB	10.750	.150	90.00	10.74	16.84*	B2CJJ	36.0	30.250	.525	-1.64	6.97	11.23	K	7.88	.702
5050D	13	22DHB	10.750	.150	90.00	16.81	8.82*	B2CJJ	36.0	30.250	.525	-2.61	1.48	8.61	K	7.32	.651
5050D	14	22DHB	10.750	.150	90.00	21.61	9.29*	B2CJJ	36.0	30.500	.650	-1.27	1.65	10.13	K	7.13	.704
5050D	13	30DHB	10.750	.150	90.00	16.18	6.24*	B2CJJ	36.0	30.250	.525	-2.61	1.48	6.96	K	6.41	.921
5050D	14	30DHB	10.750	.150	90.00	23.62	3.02*	B2CJJ	36.0	30.500	.650	-1.27	1.65	7.25	K	6.15	.847

Table 3.2.3.1

DATEC, INC.   PUNCHING SHEAR STRESS ANALYSIS OF TUBULAR JOINTS

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TABLE B. PUNCHING SHEAR ANALYSIS FOR RESIZED CHORDS

		BRACE						CHORD					STRESS FACTOR= 1.33			
JOINT NO	LOAD CASE	MEMB NO	SIZE (IN) O.D.	WALL	ANGLE (DEG)	STRESS (KSI) FA/KA	FB/KB	MEMB NO	YIELD (KSI)	SIZE (IN) O.D.	WALL	STRESS (KSI) FA	FB	PUNCHING(KSI) ALLOW	ACTUAL	F ACT/ F ALLOW
5050D	12	33DHB	10.750	.150	90.00	14.24	10.30*	B2CJJ	36.0	30.250	.525	-2.95	.03	9.73 K	7.01	.721
5050D	13	33DHB	10.750	.150	90.00	11.00	10.33*	B2CJJ	36.0	30.250	.525	-2.61	1.48	8.96 K	6.09	.680
5050D	12	4CVB	12.750	.275	52.12	17.54	4.91*	B2CJJ	36.0	30.500	.650	-2.37	.03	9.63 K	7.93	.824
5050D	13	4CVB	12.750	.275	52.12	13.42	4.25*	B2CJJ	36.0	30.500	.650	-2.10	1.19	8.92 K	6.28	.704
5050D	13	6CVB	12.750	.275	52.12	10.97	5.16	B2CJJ	36.0	30.250	.525	-2.61	1.48	8.46 K	7.24	.856
5050D	14	6CVB	12.750	.275	52.12	14.58	5.94*	B2CJJ	36.0	30.500	.650	-1.27	1.65	10.34 K	7.38	.714
5050D	13	8CVB	12.750	.275	52.12	9.73	3.86	B2CJJ	36.0	30.250	.525	-2.61	1.48	8.01 K	6.04	.754
5050D	14	8CVB	12.750	.275	52.12	13.86	4.75*	B2CJJ	36.0	30.250	.525	-1.58	2.05	8.63 K	8.22	.953
5050E	14	30EHB	10.750	.150	90.00	13.46	3.56	B2DJJ	36.0	30.250	.525	-1.22	1.10	7.68 K	4.86	.633
8050C	14	58CHB	10.750	.150	90.00	11.49	17.55*	B3CJJ	36.0	26.250	.525	-.60	8.51	12.00 K	8.30	.691
8050C	13	8CVB	12.750	.275	52.12	9.77	3.22	B3CJJ	36.0	26.250	.525	-.90	8.34	8.89 K	5.73	.644
8050C	14	8CVB	12.750	.275	52.12	13.89	4.31*	B3CJJ	36.0	26.250	.525	-.60	8.51	9.28 K	8.00	.862
8050D	12	40DHB	10.750	.150	90.00	21.93	8.47*	B3CJJ	36.0	26.500	.650	-1.06	2.36	9.59 K	7.01	.732
8050D	13	40DHB	10.750	.150	90.00	15.33	4.90*	B3CJJ	36.0	26.250	.525	-.85	2.42	8.14 K	5.78	.710
8050D	13	58DHB	10.750	.150	89.99	13.10	8.23*	B3CJJ	36.0	26.250	.525	-.85	2.42	8.67 K	6.09	.703
8050D	14	58DHB	10.750	.150	89.99	18.89	6.00*	B3CJJ	36.0	26.250	.525	-.55	1.66	8.47 K	7.11	.84[illegible]
8050D	12	63DHB	10.750	.150	89.99	23.21	.36*	B3CJJ	36.0	26.500	.650	-1.06	2.36	7.70 K	5.44	.706
8050D	12	5CVB	12.750	.275	52.12	13.07	4.76*	B3CJJ	36.0	26.250	.525	-1.32	2.94	9.24 K	7.96	.854
8050D	12	10CVB	12.750	.275	52.12	14.11	5.80*	B3CJJ	36.0	26.250	.525	-1.32	2.94	9.50 K	8.87	.934
8050D	13	10CVB	12.750	.275	52.12	8.58	5.37	B3CJJ	36.0	26.250	.525	-.85	2.42	9.14 K	6.36	.696
8050E	12	40EHB	10.750	.150	90.00	15.59	12.28*	B3DJJ	36.0	26.250	.525	-1.11	.41	10.45 K	7.96	.762
2020C	12	7CVB	12.750	.275	52.12	13.80	3.19*	A1CJJ	36.0	26.250	.525	-2.18	9.54	8.51 K	7.38	.867
2020C	13	7CVB	12.750	.275	52.12	10.10	2.58	A1CJJ	36.0	26.250	.525	-2.34	9.56	8.37 K	5.53	.661
2020C	14	11CVB	12.750	.275	52.12	11.52	2.63	A1CJJ	36.0	26.250	.525	-1.80	8.91	8.14 K	6.14	.754
2020D	12	23DHB	10.750	.150	90.00	20.27	2.76*	A1CJJ	36.0	26.250	.525	-2.12	4.04	7.01 K	6.58	.939
2020D	13	23DHB	10.750	.150	90.00	14.93	3.69	A1CJJ	36.0	26.250	.525	-2.29	4.23	7.72 K	5.32	.689
5020D	12	32DHB	10.750	.150	90.00	17.44	2.72*	A2CJJ	36.0	26.250	.525	-3.63	1.60	6.94 K	5.76	.830
5020D	13	32DHB	10.750	.150	90.00	10.33	7.57	A2CJJ	36.0	26.250	.525	-3.22	3.05	7.83 K	5.11	.653
5020D	13	42DHB	10.750	.150	90.00	6.97	14.60*	A2CJJ	36.0	26.250	.525	-3.22	3.05	8.76 K	6.16	.704
5020D	14	42DHB	10.750	.150	90.00	9.94	13.63*	A2CJJ	36.0	26.250	.525	-1.88	4.08	9.01 K	6.73	.748
5020D	13	43DHB	10.750	.150	90.00	16.30	2.71	A2CJJ	36.0	26.250	.525	-3.22	3.05	7.35 K	5.43	.739
5020D	14	43DHB	10.750	.150	90.00	23.03	.93*	A2CJJ	36.0	26.250	.525	-1.88	4.08	6.86 K	6.84	.997
5020D	14	11CVB	12.750	.275	52.12	11.55	5.50*	A2CJJ	36.0	26.250	.525	-1.88	4.08	9.73 K	7.66	.787
5020D	14	12CVB	12.750	.275	52.12	10.18	4.58	A2CJJ	36.0	26.250	.525	-1.88	4.08	9.92 K	6.61	.666
8020C	12	10CVB	12.750	.275	52.12	14.07	3.67*	A3CJJ	36.0	26.250	.525	-3.30	9.64	8.56 K	7.74	.904
8020C	14	12CVB	12.750	.275	52.12	10.22	3.78	A3CJJ	36.0	26.250	.525	-.42	7.78	9.58 K	6.21	.648
8020D	12	39DHB	10.750	.150	90.00	21.53	.59*	A3CJJ	36.0	26.250	.525	-3.25	2.91	6.74 K	6.32	.937
8020D	13	39DHB	10.750	.150	90.00	15.59	2.89	A3CJJ	36.0	26.250	.525	-1.82	2.75	6.96 K	5.28	.758
8020D	13	44DHB	10.750	.150	90.00	14.97	7.75*	A3CJJ	36.0	26.250	.525	-1.82	2.75	8.79 K	6.49	.738
8020D	14	44DHB	10.750	.150	90.00	21.43	6.25*	A3CJJ	36.0	26.250	.525	-.37	2.29	8.10 K	7.91	.977
8020E	12	39EHB	10.750	.150	90.00	15.11	4.23	A3DJJ	36.0	26.250	.525	-1.56	.38	7.59 K	5.52	.728

@FIN

Table 3.2.3.2

4.0. ALTERNATIVES

Based on the data acquired, several alternatives were considered and discussed in this section.

4.0.1. Repair Platforms.

The preliminary structural analysis for Stages I and II, discussed in the Phase A report, indicated that for an approximate 20 year return interval storm, the number of members and joints that are overstressed or do not meet punching shear requirements are significant (over 500). A repair program, therefore, to upgrade these structures to withstand a 100 year storm would be prohibitive.

Based on our analysis of the structures as they presently exist, discussed in Section 3.0, even with a five year storm return interval, a good number of joints and members are overstressed. To illustrate the costs associated with a repair program, estimates to repair and upgrade the structures to withstand a storm with a 5 year return interval are documented. With the advanced state of deterioration of the platforms a visual survey alone can not determine every defect in the platforms. To do this, the jacket would have had to be completely water blasted to bare metal. Hence, the number of members that needed repair or replacement had to be estimated based on the observed damage, an assessment of what may be damaged or cracked, but not visually observed due to marine growth, and the results of the structural analysis of the platforms (5 yr. storm).

Thus a typical repair program would consist of:

(a) Deepen the pile penetrations by approximately 50 ft. and fill the annular space with grout. The deck legs would be increased by 10 ft., so that the deck would have an approximate 5 ft. air gap during a 100 yr. storm wave.

(b) Replace key members in the structure that are presently missing or eaten away by corrosion.

(c) Install welded steel saddles over large holes in members, to improve structural qualities and seal the members.

(d) Grout other key members to seal them off and improve their structural capability.

(e) Remove the debris on and at the bottom of the jackets and install a sacrificial anode cathodic protection system, designed to last for the remaining life of the platform.

(f) Repair the deck structure and work areas.

(g) Additional engineering to reanalyze and develop a detailed and complete repair program.

The approach considered in developing the estimated costs for repair was to utilize two 500-ton derrick barges to accomplish the first step of deepening pile penetration. The dead weight of the deck is approximately 600 tons for Stage I and 350 tons for Stage II.

After this is accomplished and the deck structure reinstalled, one derrick barge would be released and the remaining work would be accomplished by the second derrick barge.

4.1. STAGE I ESTIMATED REPAIR COSTS

The estimated cost for repair of Stage I were developed as follows:

(a) Two derrick barges would be utilized to remove the deck and place it on a material barge. Insert piles, 24" OD x 3/4" wall approximately 200 ft. long, are driven into each of the original piles. The annular spaces between the insert piles and the original piles, and between the jacket and original piles are then grouted. Some jetting or air lifting will probably be required to remove the soil within the existing piles, to allow installation of the insert piles.

A ten foot 30" OD x 1" wall section is added to each of the initial piles to raise the deck by approximately 10 ft. and the deck reinstalled on the platform.

(b) For purposes of these cost estimates, it was assumed that twenty (20) members in the jacket would be replaced. To do this, divers have to be employed to remove the existing braces at the joints. The replacement braces would be field coped to fit and welded to the structure. It is assumed that wet welding would be acceptable, rather than hyperbaric welding. All the major nodes in the structure would be water blasted, and cleaned to bare metal and inspected.

(c) Approximately fifty members are assumed to require saddles welded over the member to seal off these members. These members would then be grouted.

(d) Other members with general corrosion and significant metal loss will also be grouted to improve sectional properties of the member. Approximately 75 members will be assumed to be grouted.

(e) Remove the debris around the structure and install a well designed sacrificial anode system to the structure, which will last for the remaining life of the structure, in this case five (5) years.

(f) To repair the deck structure, it was assumed that the derrick barge would make any major lifts required for equipment, etc., but that the major work could be accomplished by a small crane, off the deck, and a barge for quartering the construction personnel.

The work which would be required is to sand blast to bare metal, prime and paint the jacket, from the splash zone to the top deck. Within the deck structure, some piping revisions would be required, as well as sand blasting and painting. Where floor plating has been corroded, a 3" thick light concrete floor would be installed over the plate. For purposes of these estimates approximately 5000 sq. ft. of deck area will be concreted.

(g) Detailed engineering evaluations would be required to analyze the structures, and to determine those members which should be replaced, increased in diameter or wall thickness, or grouted.

Stage I Cost Estimates

Note: All cost estimates are based on 1981 dollars.

(a) Installation of insert piles.

Spread Cost

2 - 500 ton derrick barges @ $40,000/day	$80,000
2 - Anchor handling tugs @ $5,000/day	10,000
1 - Material barge and tug @ $4,000/day	4,000
1 - Air diving system @ $4,000/day	4,000
Total Cost/Day	$98,000

Time Required

Mobilization.	2 days
Cut deck legs and place deck on material barge.	1 day
Install piles and grout.	18 days
Add 10 ft. extensions to deck.	2 days
Reinstall deck.	1 day
Demobilize one barge.	2 days

Total Labor and Equipment Cost

= 24 x 98,000 + 2 x 45,000*	
= 2,352,000 + 90,000 =	$2,442,000

Material

= 186.24 x 200 x 16	
= 298 tons x 1,000/ton =	298,000
	$2,740,000

(b) Replace Missing Members.

$1\frac{1}{2}$ days to cut, cope and weld replacement members.

5 days to water blast clean and inspect each node.

Labor and Equipment Cost	
(20 x $1\frac{1}{2}$ + 5) x 53,000/day**=	$1,915,000
Material	55,000
	$1,970,000

*Cost of one derrick barge ($40,000) and one towing/anchor handling vessel ($5,000).

**Cost of spread ($98,000) less one derrick barge and anchor handling vessel ($45,000).

(c) Install saddles over large holes in members. Saddles are prefabricated. Approximately ¼/day/saddle to install.

<u>Labor and Equipment Cost</u>	
50 x ¼ x $53,000/day* =	$ 662,500
<u>Material</u>	12,500
	$ 675,000

(d) Grout key members.

Weld two nozzles, grout and seal nozzles.

Approx. 1/3 day/member.

<u>Labor and Equipment Cost</u>	
75 x 1/3 x $53,000* =	$1,323,675
<u>Material Grout</u>	26,325
	$1,350,000

(e) Remove debris around structure.

3 days @ $53,000/day	$ 159,000
Add sacrificial anode system.	
15 days @ $53,000/day	795,000
Material	91,000
	$1,045,000

(f) Repair deck structure.

Assume one day of DB time for major lift, then demobilize derrick barge & equipment spread.

3 days @ $53,000/day	$ 159,000

*See page 57 for documentation.

Equipment required for refurbishing deck:

1 paint/sand blasting vessel	$ 8,000/day
1 crane	2,000/day
1 quarters barge	6,000/day
	$16,000/day

Approximately 21 days will be required to sandblast/paint and repair.

Labor and Equipment	
21 x 16,000 =	$ 336,000
Material	114,000
	$ 609,000

(g) Engineering.

The cost of engineering analysis of the jacket and deck sections is estimated at $150,000. The cost is high because of the number of computer runs required to evaluate all the possible member and geometry conditions of the jacket.

SUMMARY OF REPAIR COSTS - Stage I

A.	Installation of Insert Piles.	$2,740,000
B.	Replace Missing Members.	1,970,000
C.	Install Saddles.	675,000
D.	Grout Key Members.	1,350,000

E.	Remove Debris and Add Anodes.	$1,045,000
F.	Repair Deck Structure.	609,000
G.	Additional Engineering.	150,000
	Contingencies (approx. 15%)	1,261,000
	TOTAL	$9,800,000*

Comments: The estimated total cost for repair is $9,800,000. Several assumptions had to be made in developing these estimates as discussed earlier, e.g., the number of members to be replaced, the number to be grouted, etc. No weather downtime due to hurricanes over the approximately 100 days required for repair was included in the contingency, nor items such as gross deviations from plans, changed conditions, etc. Many members which were not cleaned and inspected in detail may on closer inspection require replacement. Hence the costs for repair have little down side potential and much greater chance to significantly exceed the above cost estimate.

4.2. STAGE II ESTIMATED REPAIR COSTS

The estimated costs to repair Stage II were developed using the same unit costs as for Stage I. The procedure to be followed would be to:

(a) deepen the pile penetration by approximately 50 ft. and fill the annular spaces with grout. The deck would be raised approximately 10 feet.

*Cost in 1981 dollars.

(b) replace 15 members in jacket.

(c) weld steel saddles over 30 members.

(d) grout approximately 50 members to seal off the members.

(e) remove debris and install sacrificial anode systems.

(f) repair the deck structure and work areas.

(g) detailed structural analysis.

The developed costs assumed that only one of the platforms would be repaired. If both platforms are considered, then the total cost will be slightly less than the sum of each cost, by the amount of one mobilization and demobilization.

Cost Estimates

(a) Installation of insert piles.

Time required

Mobilization	2 days
Cut deck legs and place on material barge	1 day
Install piles and grout	10 days
Add 10 ft. extensions	1 day
Demobilize one barge	2 days

Labor and Equipment

14 x 98,000 + 2 x 45,000 =	$1,462,000
Material	150,000
	$1,612,000

(b) Replace missing members.

Cut cope and weld replacement members.	$1\frac{1}{2}$ days/member	
Water blast to bare metal all nodes and inspect.	3 days	
<u>Labor and Equipment Cost</u>		
15 x $1\frac{1}{2}$ x 53,000 =		\$1,192,500
3 x 53,000 =		159,000
<u>Material</u>		18,500
		\$1,370,000

(c) Install saddles.

Time required/saddle.	$\frac{1}{4}$ day	
<u>Labor and Equipment Cost</u>		
30 x $\frac{1}{4}$ x 53,000 =		\$ 397,500
<u>Material</u>		5,500
	Total	\$ 403,000

(d) Grout key members.

Time required/member.	1/3 day	
<u>Labor and Equipment Cost</u>		
50 x 1/3 x 53,000 =		\$ 883,333
<u>Material</u>		16,666
	Total	\$ 900,000

(e) Remove debris and install cathodic protection system.

Approximately 13 days required.

Labor and Equipment Cost

13 x 53,000 =	$ 689,000
Material	60,000
	$ 749,000

(f) Repair deck structure.

Assume one day of derrick barge time then demob derrick barge (2 days)

3 days @ 53,000 =	$ 159,000

Utilize same equipment as described in Stage I:

Sand blast paint and repair = 17 days

Labor and Equipment

17 x 16,000 =	272,000
Material	87,000
Total	$ 518,000

SUMMARY OF REPAIR COSTS - Stage II

A.	Installation of Insert Piles.	$1,612,000
B.	Replace Missing Members.	1,370,000
C.	Install Saddles.	403,000
D.	Grout Key Members.	900,000
E.	Remove Debris and Add Anodes.	749,000
F.	Repair Deck Structure.	518,000
G.	Additional Engineering.	100,000
	Contingencies (Approx. 15%)	848,000
	Total	$6,500,000*

* Cost in 1981 dollars

The same comments made for the Stage I platform apply here as well.

4.3. DEMOLITION AND DISPOSITION

Two cases are considered a) salvage by design and b) salvage after the structures have fallen over due to a major storm or hurricane.

In developing the procedures for salvage of the two structures, it was assumed that the platforms and all debris presently existing on bottom would be cleared away. Piling would be removed to a depth of 15 ft. below the mud line where possible as per the general requirements of the Bureau of Land Management. The possibility of utilizing either structure as a natural reef either in place or towed to an acceptable location was not considered, at the request of the Naval Coastal Systems Center, Panama City, Florida.

4.3.1. Salvage by Design: The suggested procedure would be to remove the deck in sections, such that a 500-ton derrick barge could be utilized. These deck sections would be placed on a material barge. Through the exposed piling, explosive charges would be placed at a depth of approximately 15 ft. below the mud line, to sever the piling. Air lifting may be required to get to the required depth. An attempt to recover the individual piles would be made. Any recovered piling would be placed on the material barges. The jacket would then be picked up and placed on a material barge. In the case of Stage I, the bracing at the +10 ft. elevation between the two 8-pile platforms would be removed and each platform recovered individually and placed on a material barge. Divers would then be utilized to assist in the recovery of the remaining debris on bottom.

It is assumed that the cost of cutting up the steel is equal to the salvage cost of steel. Thus no credit for sale of the steel is applied in our estimates.

4.3.1.1. Cost Estimates.

Spread Cost:

1	500 ton derrick barge	$40,000/day
3	Material barges	3,000
1	Derrick barge tug	5,000
3	Material barge tugs	12,000
1	Air diving system	4,000
	Cost	$64,000/day

Time Required for Salvage:

Mobilization	2 days	
Recover Stage I	6 days	
Move & recover Stage II	5 days	
Demobilize & place structures on land	3 days	
Total Time	16 days	
Total estimated cost for salvage = 16 x 64,000 =		$1,024,000
Contingency approx. 10%		101,000
	Total	$1,125,000*

4.3.2. Salvage of Structures if Fallen Over:

In the event the structures have collapesed due to a severe storm or hurricane, recovery of the debris on bottom would be more time consuming. The structures would have to be cut up in manageable pieces (weight and/or dimensions) and extensive use of divers would be required. However, rather than using an expensive derrick barge, a shear-leg barge was utilized for development of the cost estimates. It is also assumed

* Cost in 1981 dollars.

that the cost of cutting up the steel is equal to the salvage value of the steel.

4.3.2.1. Cost Estimates.

Spread Cost.

1	Shear leg barge	$12,000/day
1	Diving system	6,000/day*
3	Material barges	3,000/day
3	Material barge tugs	9,000/day
1	Shear leg barge tug	5,000/day
	Total	$35,000/day

Time Required for Salvage.

Mobilization	- 2 days
Recover Stage I	-25 days
Recover Stage II	-16 days
Demobilization	- 2 days
Total	45 days

Total estimated cost for salvage =

45 x 35,000 =	$1,575,000
Contingency approx. 10%	155,000
Total	$1,730,000**

* Cost of air diving operations greater because of continuous operations.

** Cost in 1981 dollars.

4.4. COST OF A NEW PLATFORM

Based on discussions with Naval personnel in Panama City, we understand that if the structures were to be replaced, only one would be required. This would be installed in a water depth of approximately 100 ft. Hence, the cost of a new platform was estimated on the basis of this water depth, and the general layout of the deck super structure on Stage I. The platform is assumed to be a 4-pile battered structure, designed to withstand a 100 yr. storm.

The cost estimate was developed based on our experience in the design of platforms for these water depths, with similar type loads.

Jacket weight	350 tons @ $1500/ton	$ 525,000
Piling	375 tons @ $1100/ton	412,500
Deck	400 tons @ $2000/ton	800,000
Building - Quarters & Lab.	(60 x 70 two stories) @ $200/sq. ft.	1,440,000
Heliport for C-53	75 tons @ $2000/ton	150,000
Generators	2 - 100 KW	150,000
Miscellaneous equipment		100,000
Engineering design		225,000
Site Investigation		100,000
Installation		900,000
Contingencies (Approx. 10%)		497,500
	Total Cost	$5,300,000*

* Cost in 1981 dollars

The total installed cost of a platform in 100 ft. of water is estimated at $5,300,000. Without equipment and quarters, which can vary depending on the Navy's requirements, the cost of a structure and deck installed would be approximately $3,300,000.

Reuse of one of the decks from Stage I or Stage II was briefly considered. However the cost of modification and repair would far exceed the costs of a new deck.

5.0. CONCLUSIONS AND RECOMMENDATIONS

a) The platforms as they presently exist do not meet minimum design requirements based on today's analysis standards, even for a five-year storm wave. However, they do withstand a predicted one-year storm wave.

b) The cost to repair the platforms to withstand a 100-year storm wave is deemed to be prohibitive and was not evaluated.

c) The estimated cost to upgrade the platforms to withstand a five-year storm is presented to illustrate the magnitude of costs involved. For Stage I, we estimate the cost to be at least $9,800,000, and for Stage II, at least $6,500,000. These cost estimates have little downside potential and the final costs of a repair program, if carried out, could significantly exceed these estimates.

It would also be very difficult to assess the structural integrity of a platform with any degree of confidence after a repair program of this magnitude.

d) The cost to salvage the structures had been developed for two situations, planned and unplanned. If salvage takes place prior to the structures falling over, we estimate the cost of salvage to be $1,125,000. If salvage takes place after both structures have fallen over, the estimated cost would be $1,730,000 or approximately $600,000 more.

e) The estimated cost of a replacement platform for a 100 ft. water depth is $5,300,000. Without facilities on the platform, which may vary depending on the U. S. Navy requirements, the cost of a structure and deck installed in this water depth is estimated at $3,300,000. Based on today's market, the time required for design, fabrication and installation of such a structure would vary between eighteen and twenty-four months from award of contract.

f) Recommendations.

1. Based on our engineering analysis and inspection results, we recommend that a program to salvage these structures be initiated immediately. BCI would be happy to assist the U. S. Navy in such a program.

2. In the event the U. S. Navy wishes to continue to utilize these structures until they fall

over, then the following safety precautions should be strictly adhered to:

i. Personnel should only be allowed on Stages I and II during daylight hours. A standby boat or small helicopter shall be available while personnel are on board the platforms.

ii. No personnel shall be allowed to remain on the platforms if sea conditions of 7 to 8 feet or greater are experienced.

iii. The platforms should be visually inspected after each storm having waves in excess of 10 feet, to determine if additional members have parted, or at least once a year.

3. If the continued use of a platform is justifiable, the most economical alternative is to replace one of the platforms with a new platform, designed and built under today's standards. BCI would be happy to assist the Navy in the design and project management of the overall project.

6.0. REFERENCES

A. Reports.

1. Phase A - Inspection Plan Review - Stages I & II, Offshore Panama City, Florida, by Barnett & Casbarian, Inc.

B. Design Codes and Standards.

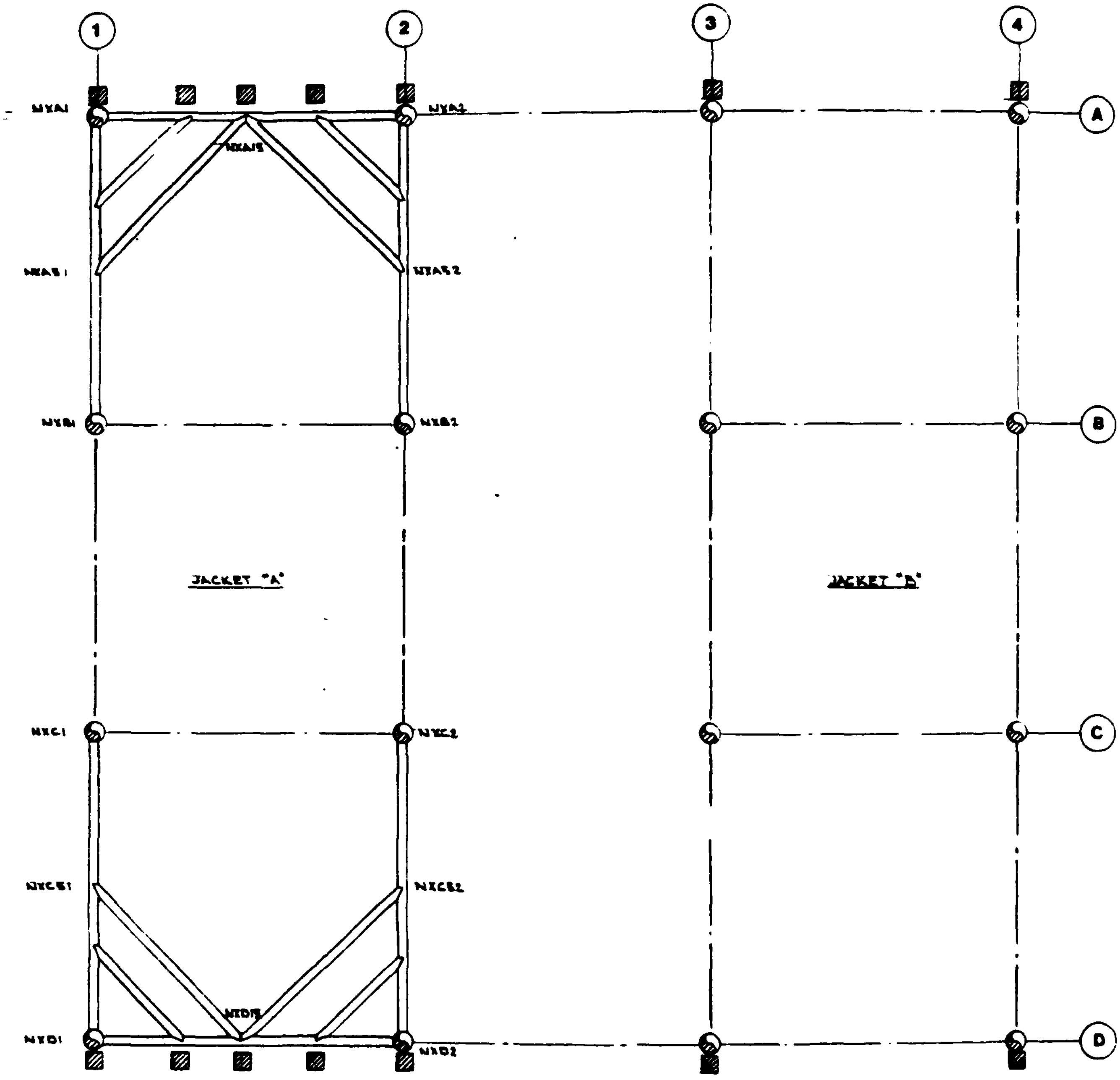
1. Manual of Steel Construction, AISC, Seventh Edition.
2. API RP 2A, Eleventh Edition, January 1980.
3. A.W.S. D1.1-80 "Structural Welding Code".

C. Computer Programs: Datec, Inc.

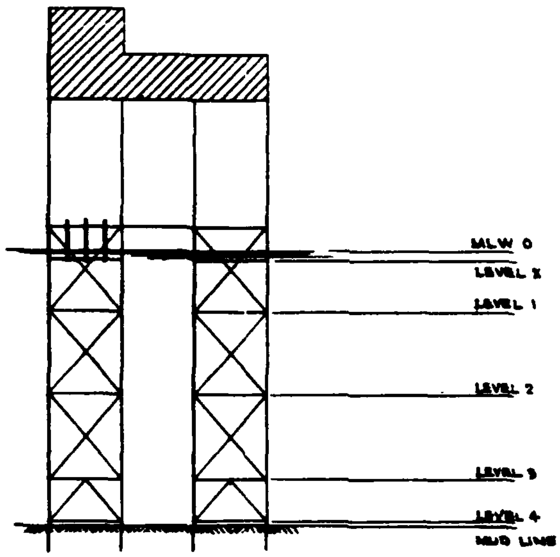
1. SIP (Structural Input Plot Program).
2. STREAM (Wave Generating Program).
3. STEEL (Weight Computation Program).
4. WAVLD (Wave Loading Program).
5. SEAP (Structural Engineering Analysis Program).
6. UNITY (Member Axial/Bending Stress Interaction Program).
7. JOINT (Punching Shear Analysis Program).
8. SEACAPS (Seas Coupled Analysis of Piled Structures).
9. AXIAL (Soil Mechanics Program).

D. Video Tapes.

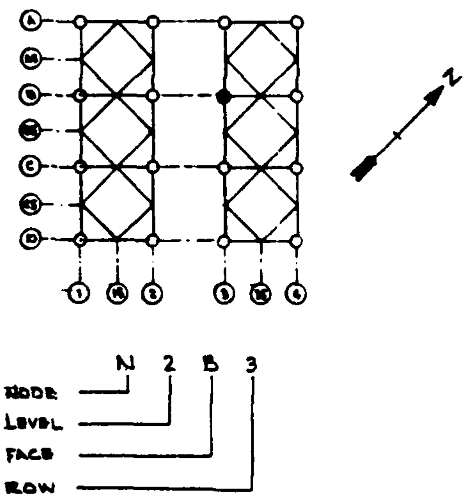
1. Two edited tapes of the highlights of the subsea inspection. Tape A for Stage I; Tape B for Stage II.



LEVEL "X"



FACE "D"



REFERENCE SYSTEM

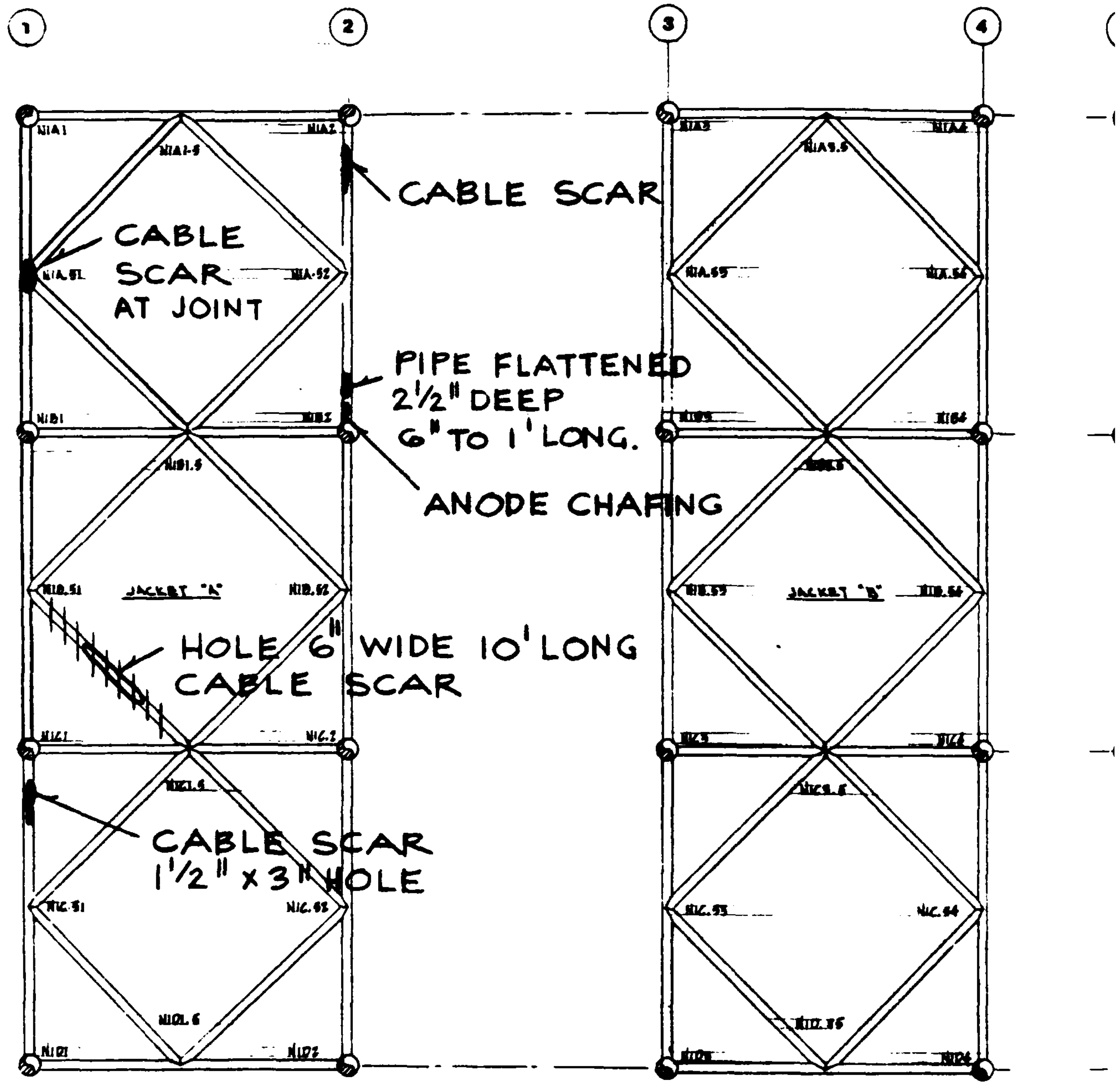
BARNETT & CASBARIAN, INC.
ENGINEERING & MARINE CONSULTANTS • MARINE SURVEYORS

NONE
10/80

OFFSHORE PANAMA CITY, FLORIDA

BCI-001 A

2

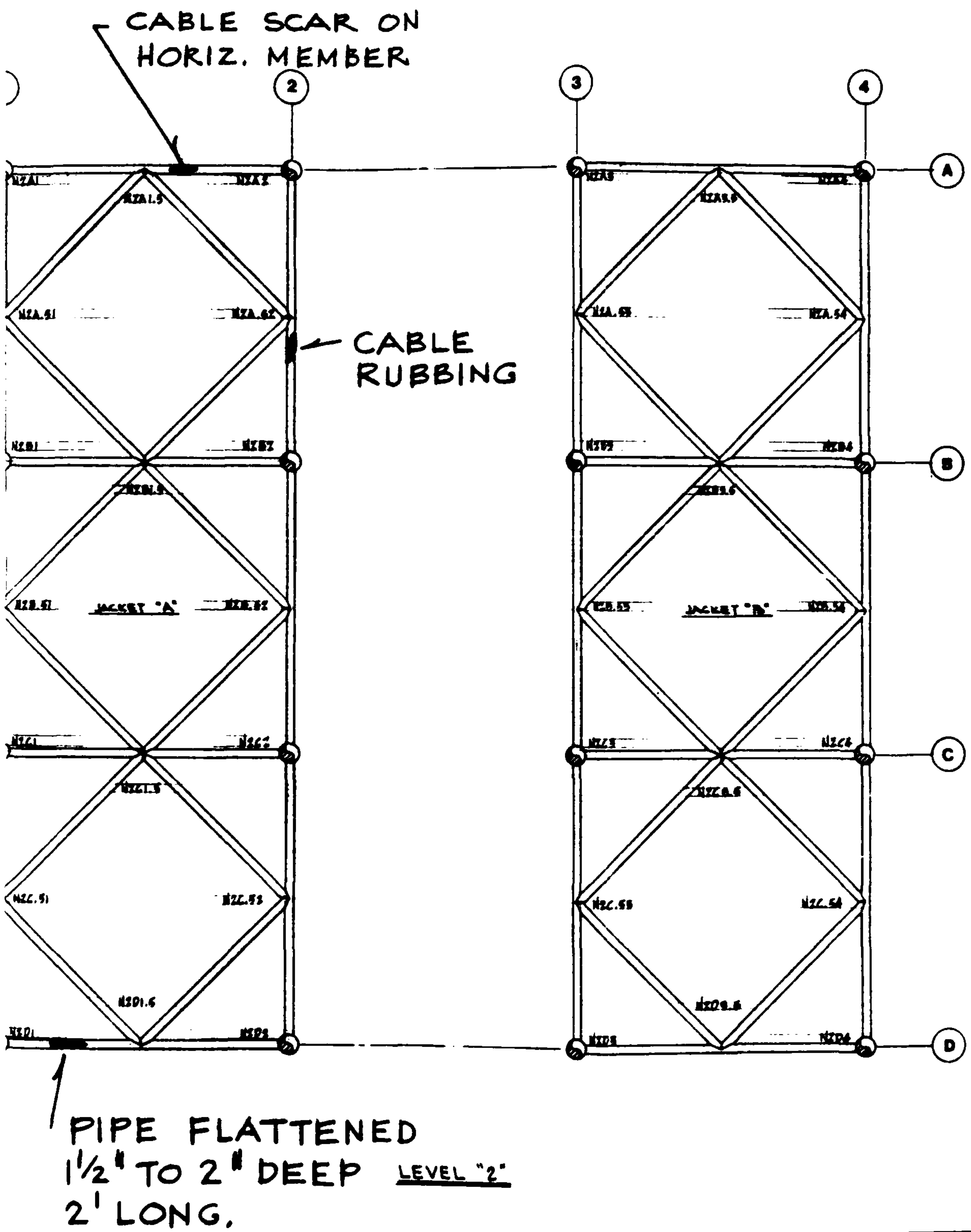


LEVEL "1"

NOTE:

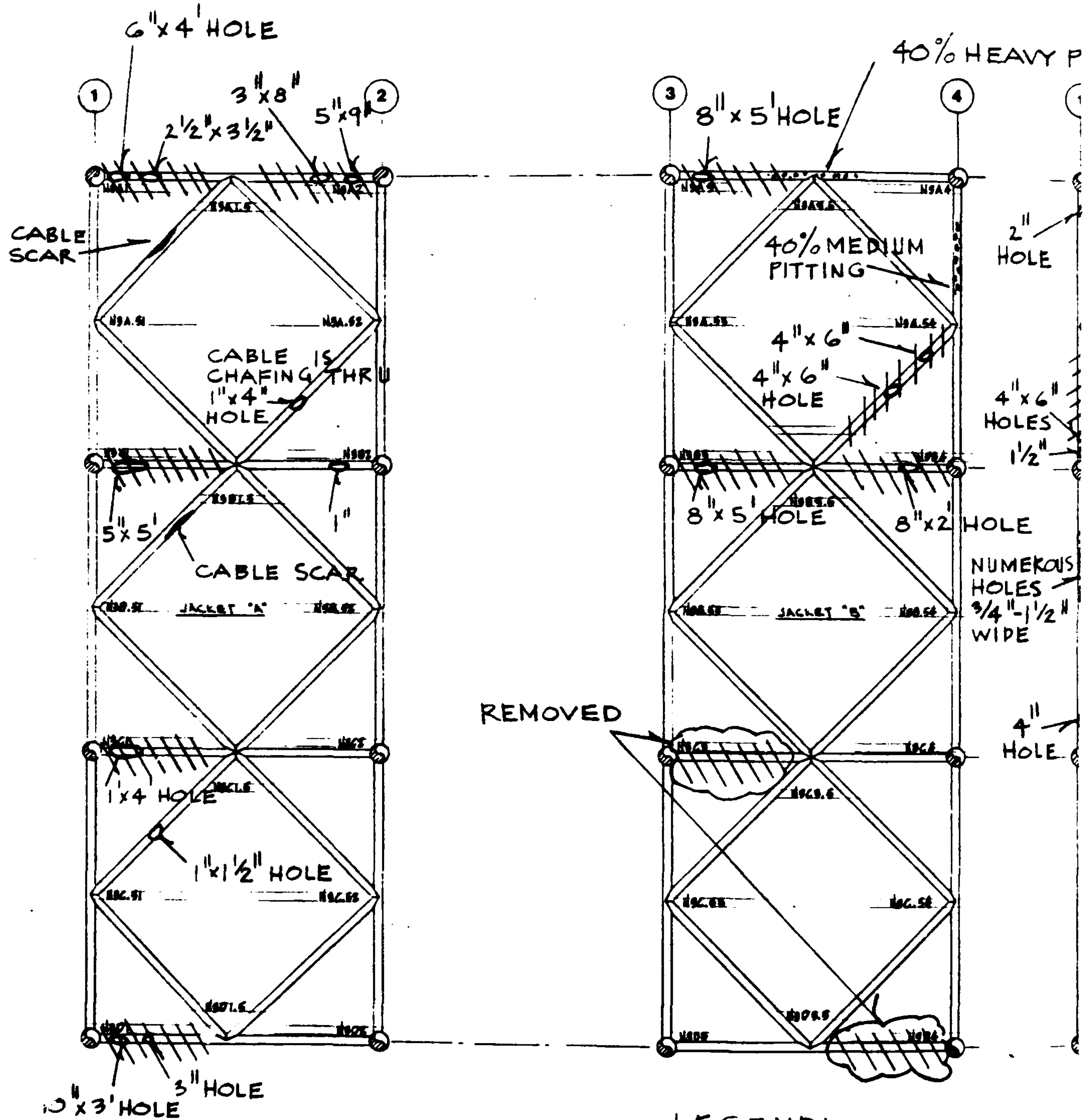
(1)- SHOWN ARE THE MOST SEVERE CASES FOUND DURING INSPECTION.

(2)-



///// DENOTES MEMBERS REMOVED FOR STRUCTURAL ANALYSIS.

BARNETT & CASBARIAN, INC. ENGINEERING & MARINE CONSULTANTS · MARINE SURVEYORS		
NONE		E.H.
10/80		
OFFSHORE PANAMA CITY, FLORIDA U.S. NAVY CONTRACT N62477-80-0196		
STAGE I, LEVEL "1" & LEVEL "2"		BCI-002A



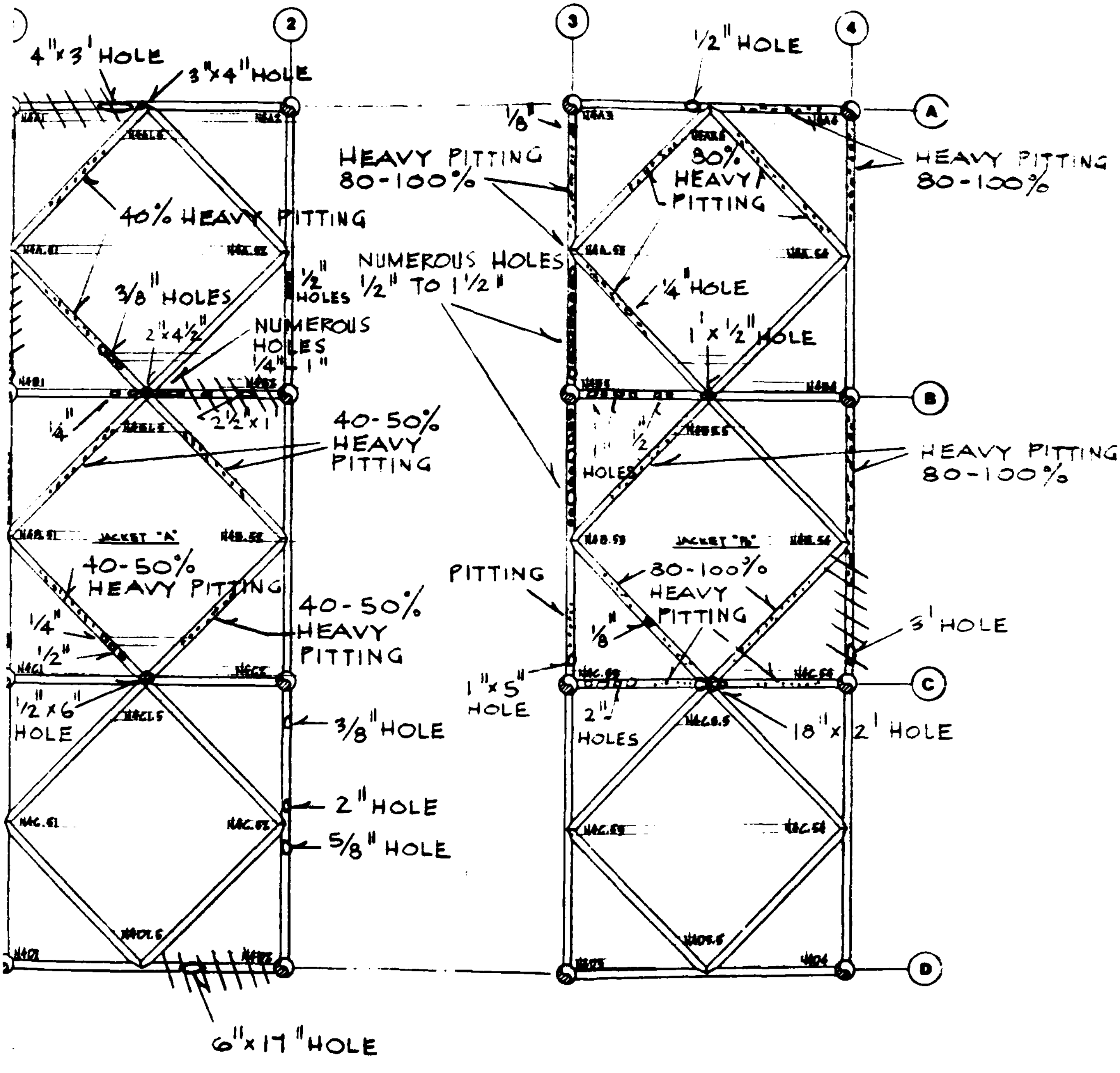
LEGEND:

LEVEL "3"

- %- INDICATES COVERAGE
- LIGHT PITTING IS < 1/
- MEDIUM PITTING IS 1/32"-
- HEAVY PITTING IS > 1/8'

\\\\\\\ DENOTES MEMB
FOR STRUCTUR

ITTING



LEVEL "4"

E OF PITS.

32" IN DEPTH

. 1/8" IN DEPTH

" IN DEPTH

ERS REMOVED

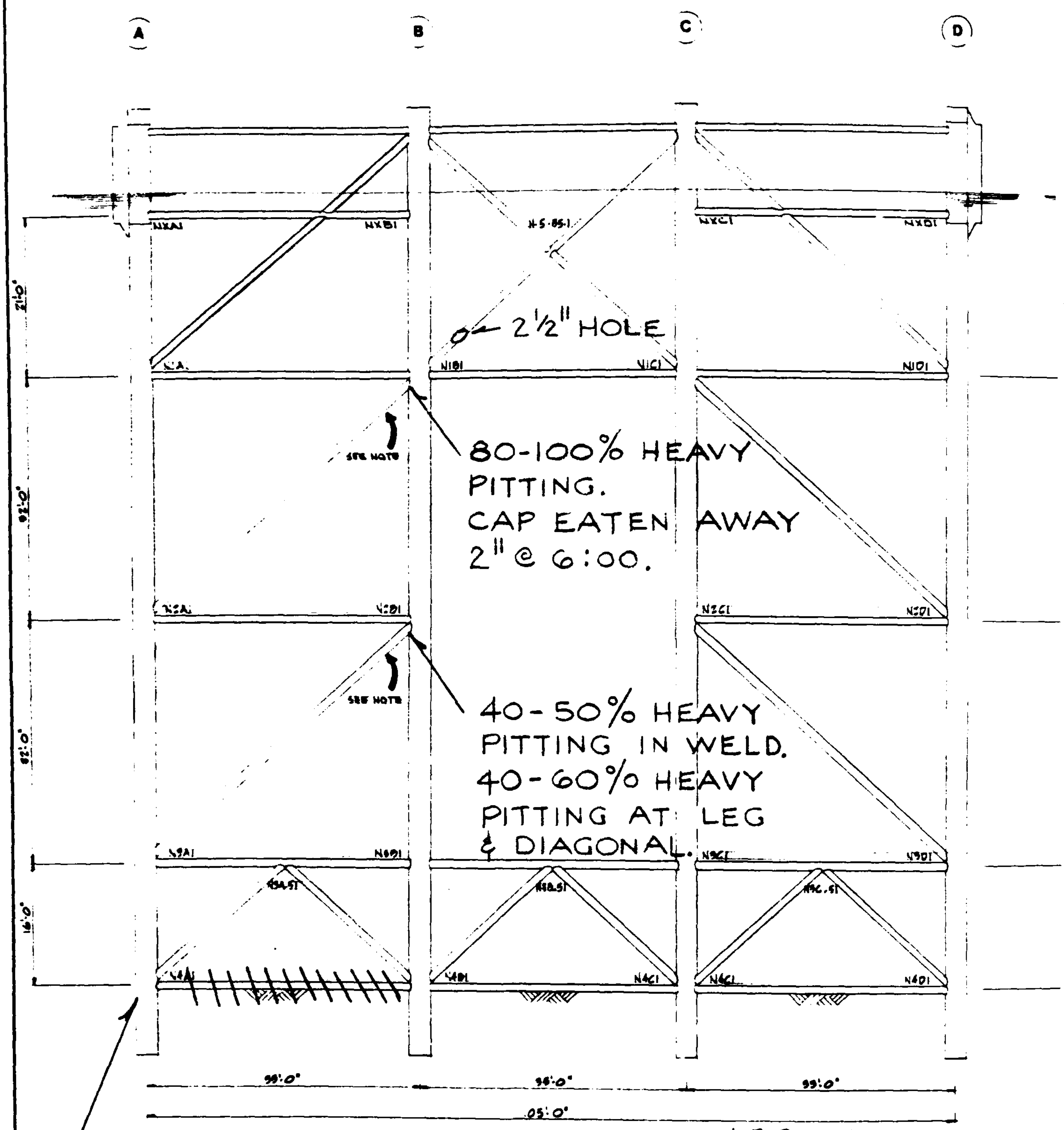
AL ANALYSIS.

BARNETT & CASBARIAN, INC.

STAGE I, LEVEL "3" & LEVEL "4"

BCI-303

2

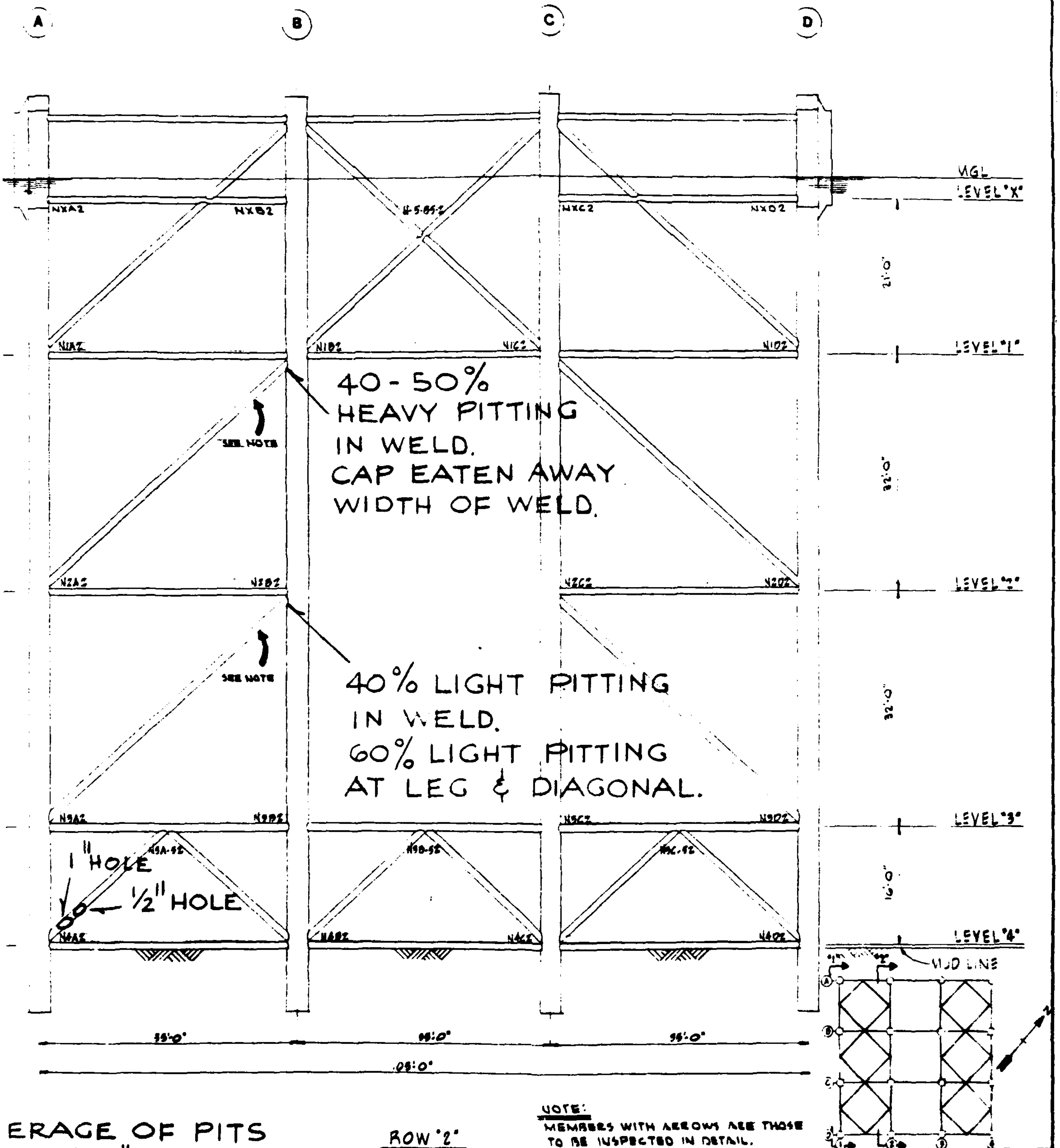


2 ANODES RUBBING
ON INNER PART OF LEG.
6" TO 1' BARE METAL
IS VISIBLE ON LEG.

ROW '1'

LEGEND.

- %-INDICATES COV
- LIGHT PITTING IS
- MEDIUM PITTING I
- HEAVY PITTING IS



ERAGE OF PITS
, < 1/32" IN DEPTH
S 1/32" - 1/8" IN DEPTH
S < 1/8" IN DEPTH

ROW "2"

NOTE:
MEMBERS WITH ARROWS ARE THOSE TO BE INSPECTED IN DETAIL.

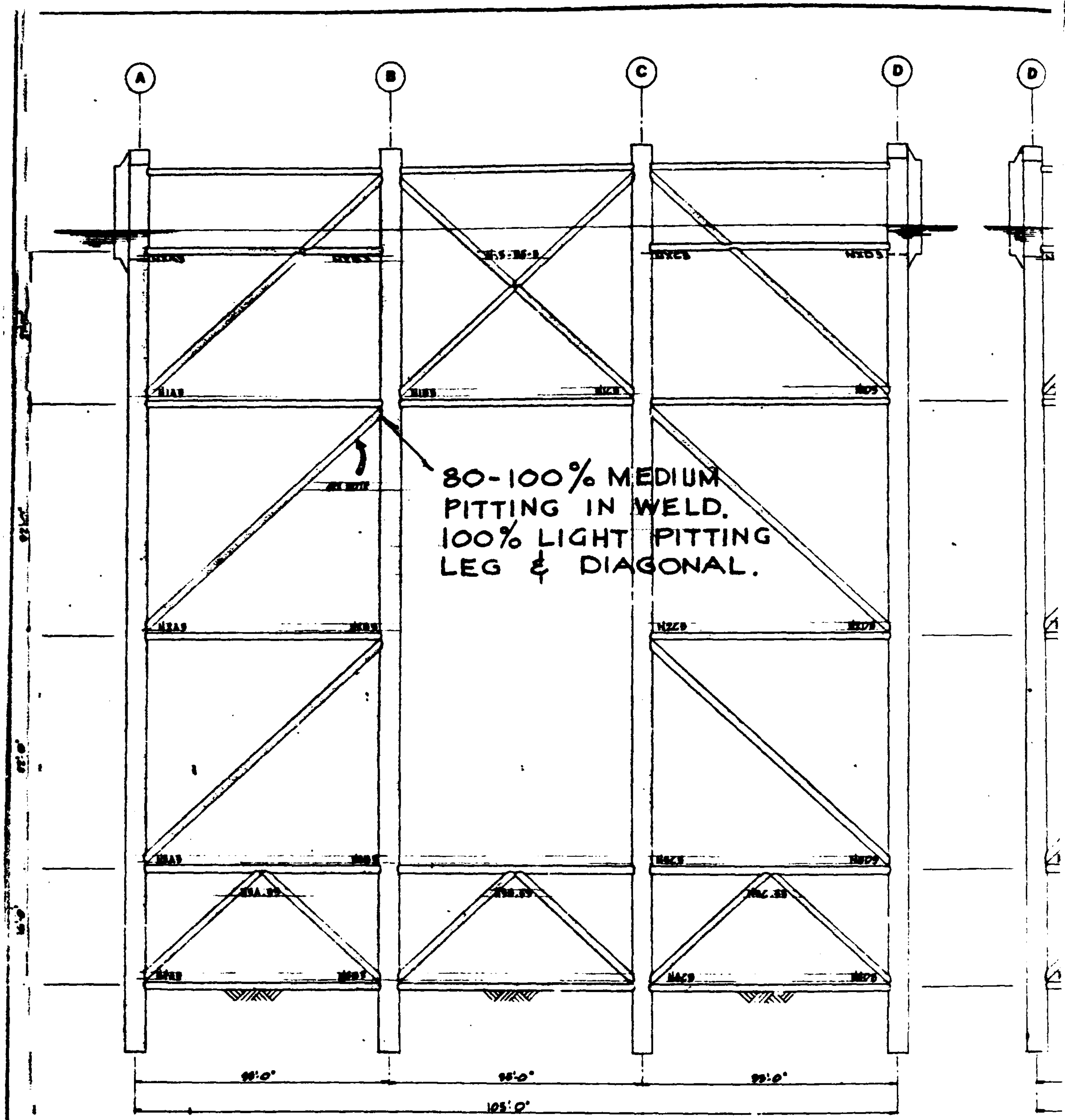
\\\\\\ DENOTES MEMBERS REMOVED FOR STRUCTURAL ANALYSIS

BARNETT & CASBARIAN, INC.
ENGINEERING & MARINE CONSULTANTS

SCALE: NONE
DATE: 0180

STAGE I. ROW "1" & ROW "2"

2



ROW "3"

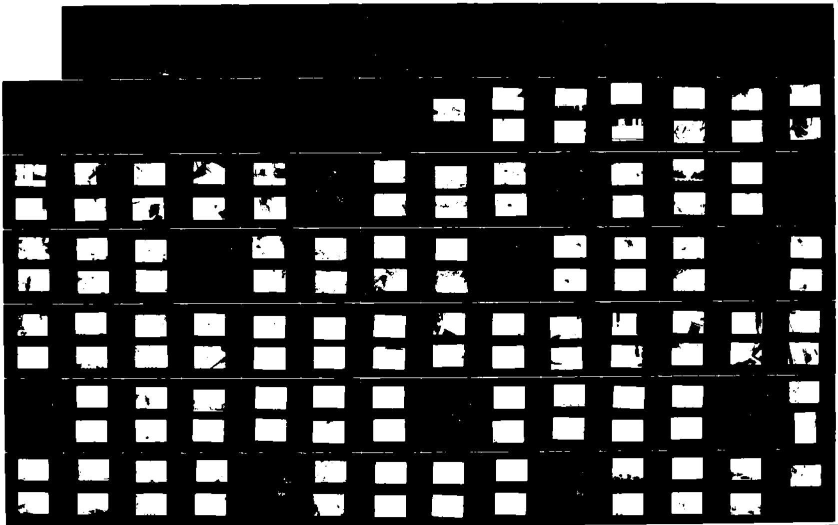
/////// DENOTES MEMBERS REMOVED FOR STRUCTURAL ANALYSIS.

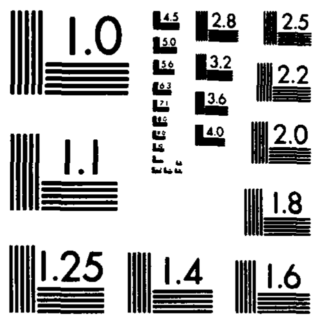
LEGEND

- %-INDICATES COVER
- LIGHT PITTING IS <
- MEDIUM PITTING IS
- HEAVY PITTING IS >

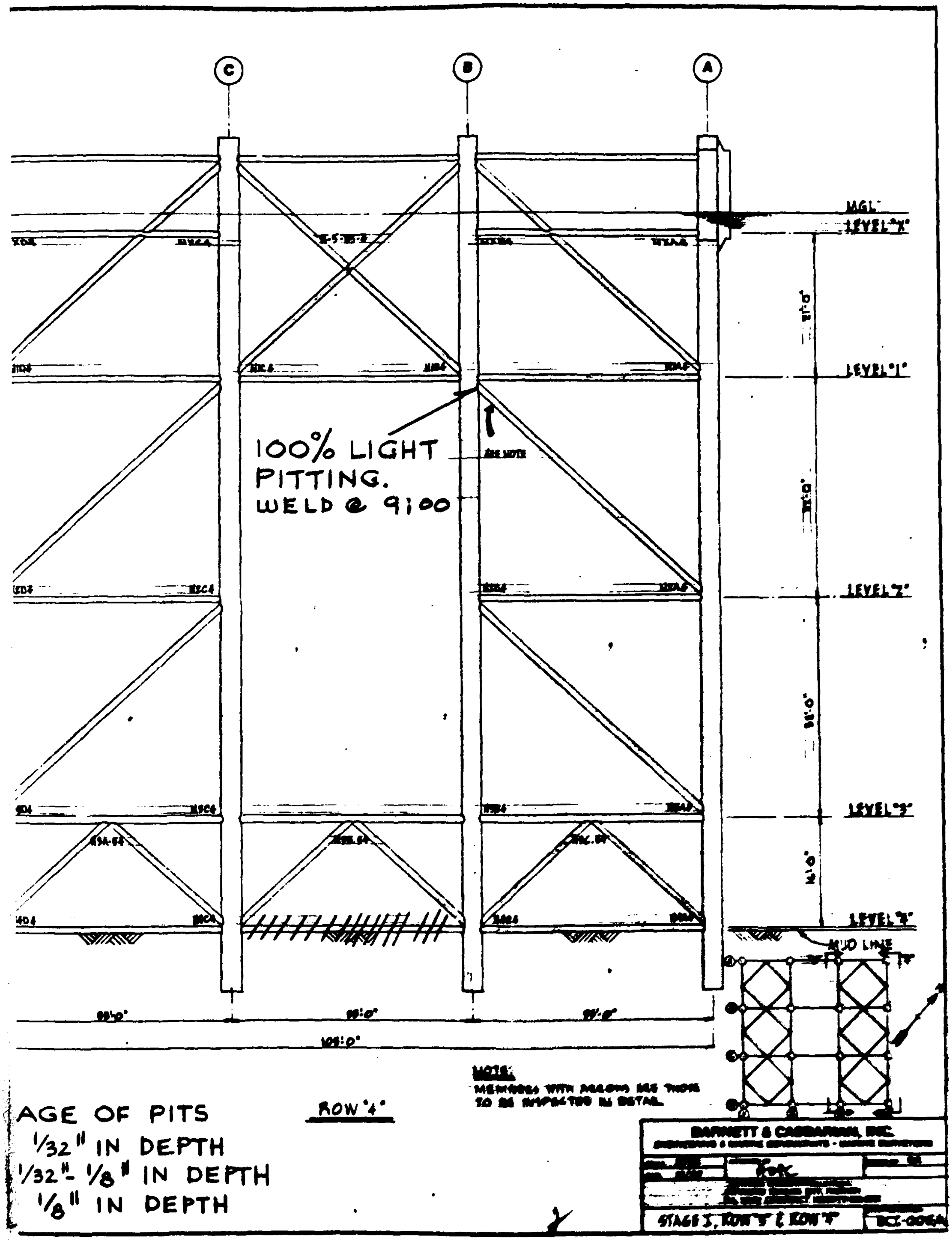
AD-A180 701 STAGE I AND II PLATFORM STRENGTH EVALUATION OFFSHORE PANAMA CITY FLORIDA(U) BARNETT AND CASBARIAN INC METAIRIE LA FEB 81 CHES/NAVFAC-FPO-8331A 2/3

UNCLASSIFIED N62477-80-C-0194 F/G 13/10 NL

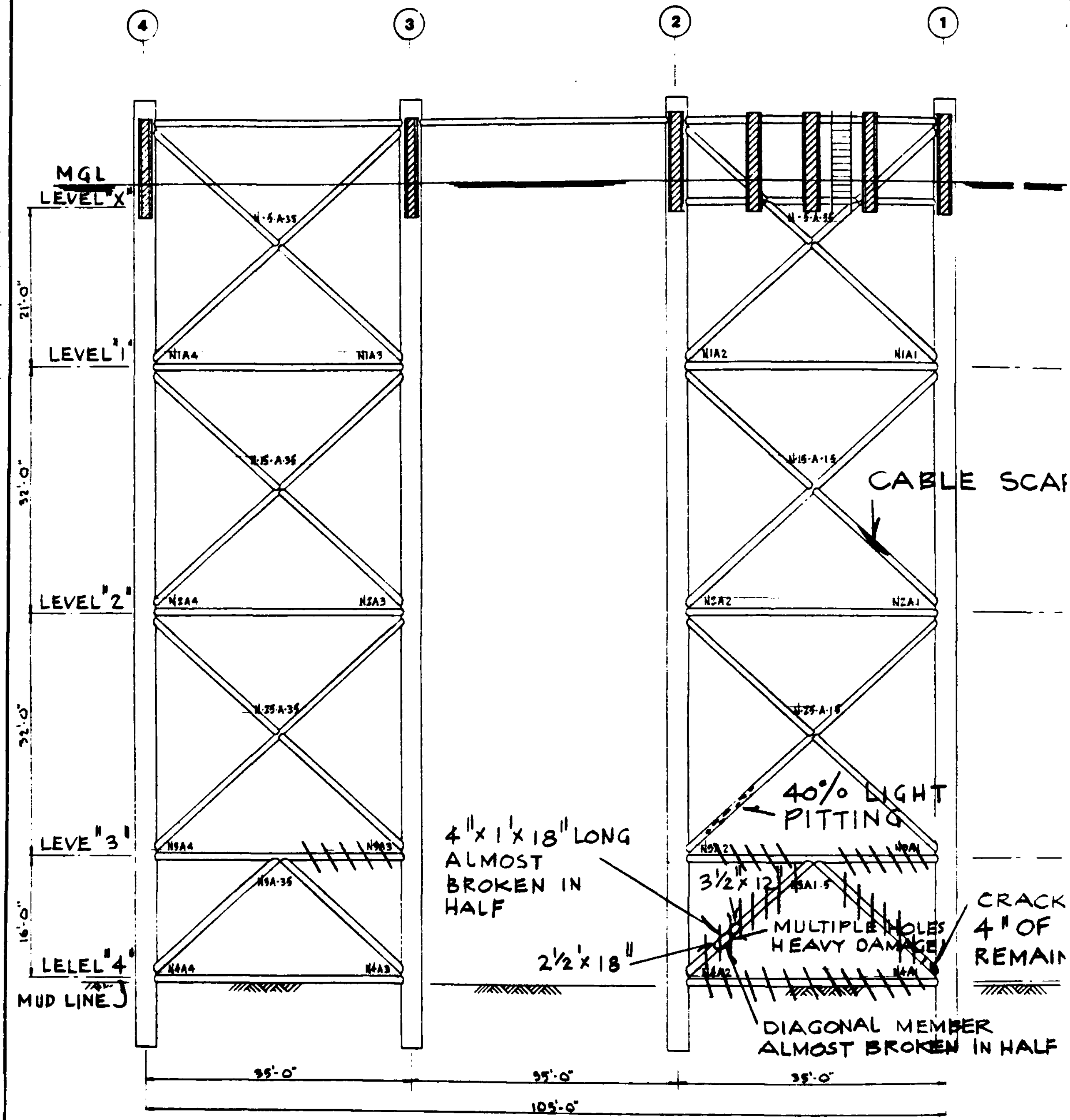




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



C
B
A
MGL
LEVEL "X"
LEVEL "1"
LEVEL "2"
LEVEL "3"
LEVEL "4"
MUD LINE
100% LIGHT
PITTING.
WELD @ 9:00
NOTE:
MEMBERS WITH ARROWS ARE THOSE
TO BE INSPECTED IN DETAIL.
ROW "4"
AGE OF PITS
1/32" IN DEPTH
1/32"- 1/8" IN DEPTH
1/8" IN DEPTH
BARNETT & CASBARIAN, INC.
STAGE 3, ROW "3" & ROW "4"

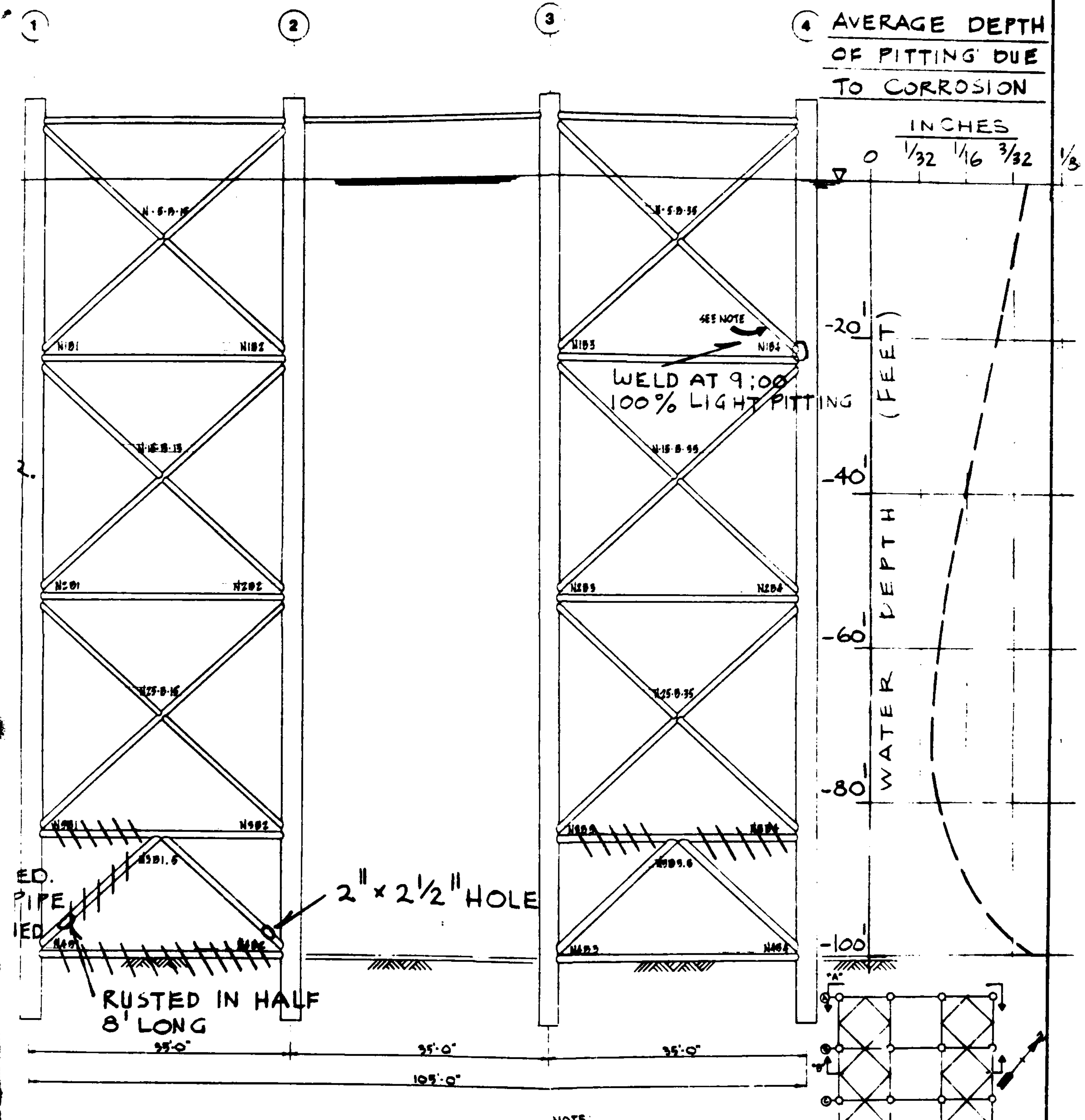


FACE "A"

\\\\\\\ DENOTES MEMBERS REMOVED FOR STRUCTURAL ANALYSIS.

LEGEND:

- % - INDICATES COVER
- LIGHT PITTING IS < 1/
- MEDIUM PITTING IS 1/32
- HEAVY PITTING IS > 1/



NOTE:
MEMBERS WITH ARROWS ARE THOSE TO BE INSPECTED IN DETAIL.

FACE 'B'

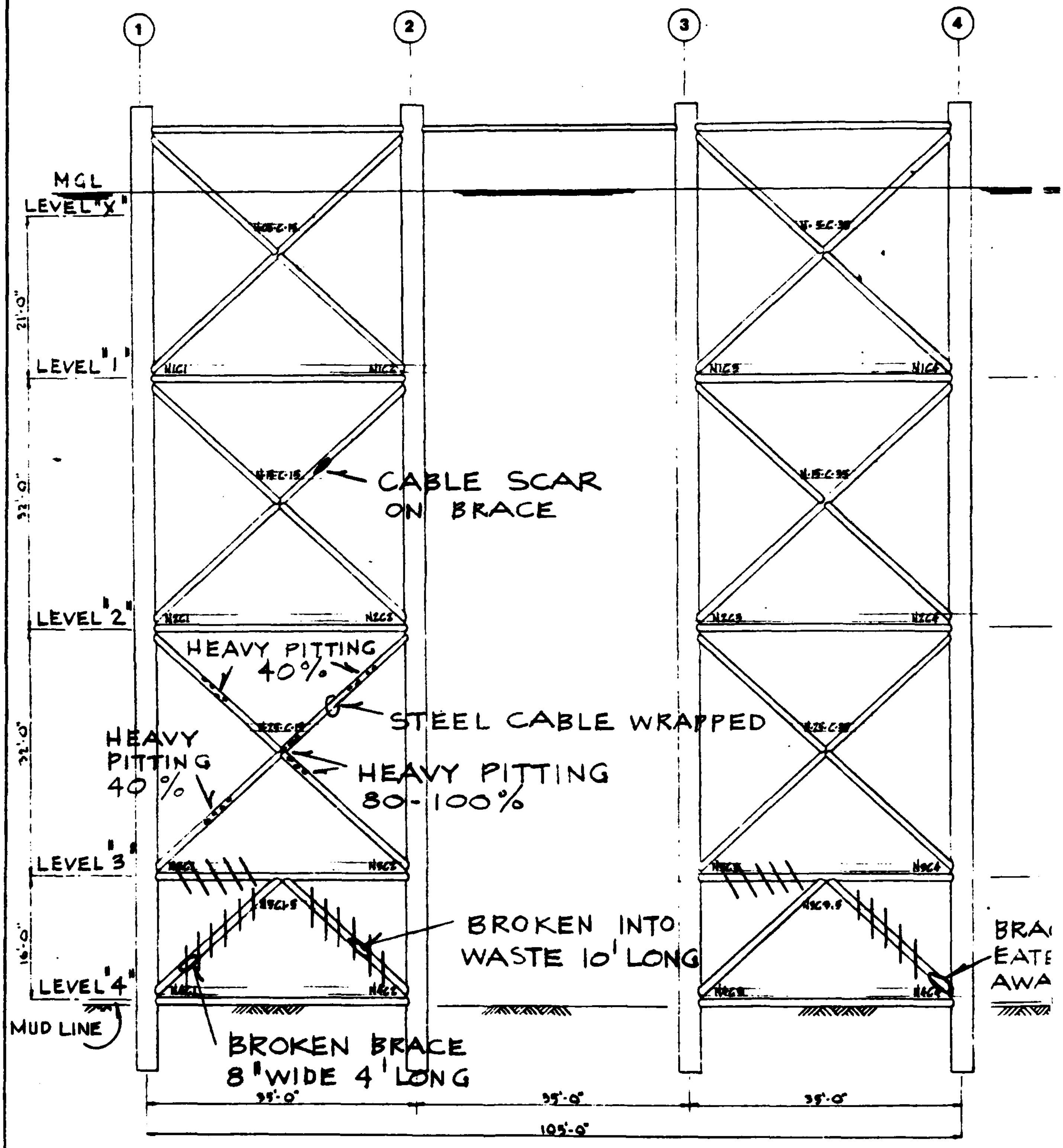
AGE OF PITS.
32" IN DEPTH
"- 1/8" IN DEPTH
8" IN DEPTH

BARNETT & CASBARIAN, INC.
ENGINEERING & MARINE CONSULTANTS - MARINE SURVEYORS

SCALE NONE	APPROVED BY H.T.C	DRAWN BY R.H
DATE 10/86		

STAGE I FACE 'A' & FACE 'B'

BCI-00-A



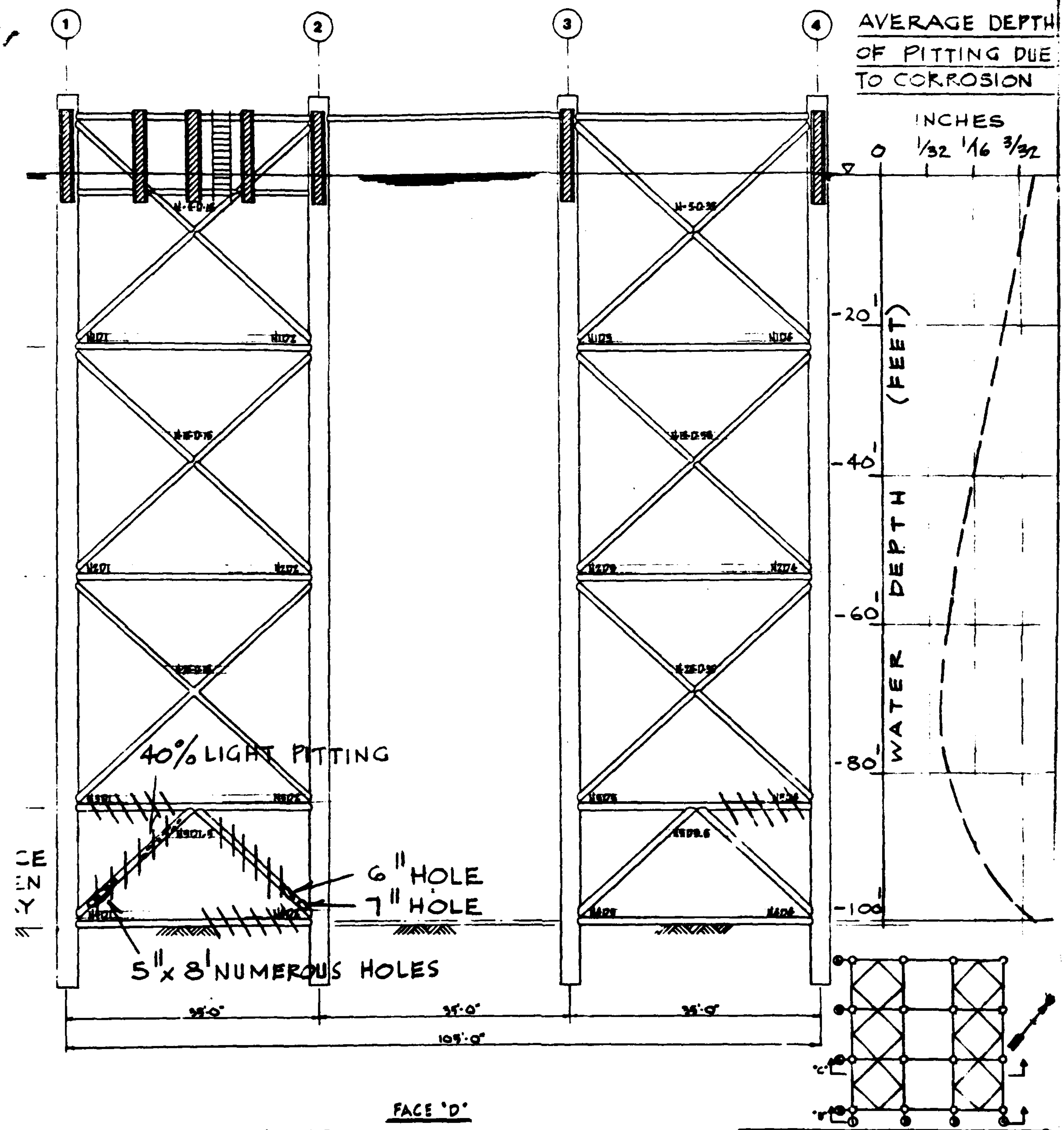
FACE "C"

\\\\\\ DENOTES MEMBERS REMOVED FOR STRUCTURAL ANALYSIS.

NOTE:

SHOWN ARE THE M

FOUND DURING INS



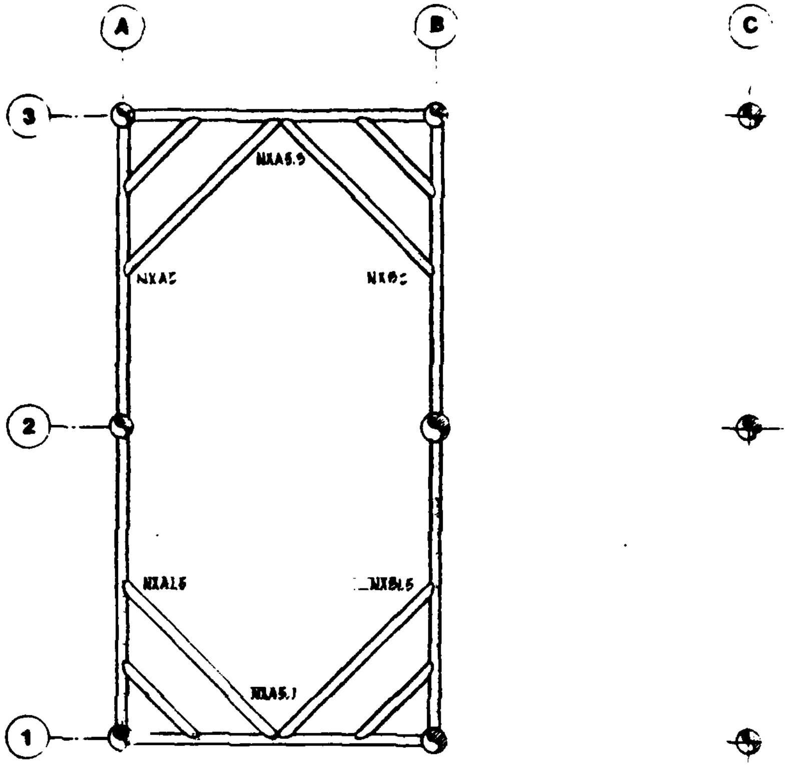
FACE 'D'

OST SEVERE CASES
PECTION.

BARNETT & CASBARIAN, INC.
ENGINEERING & MARINE CONSULTANTS - MARINE SURVEYORS

NONE
10/86

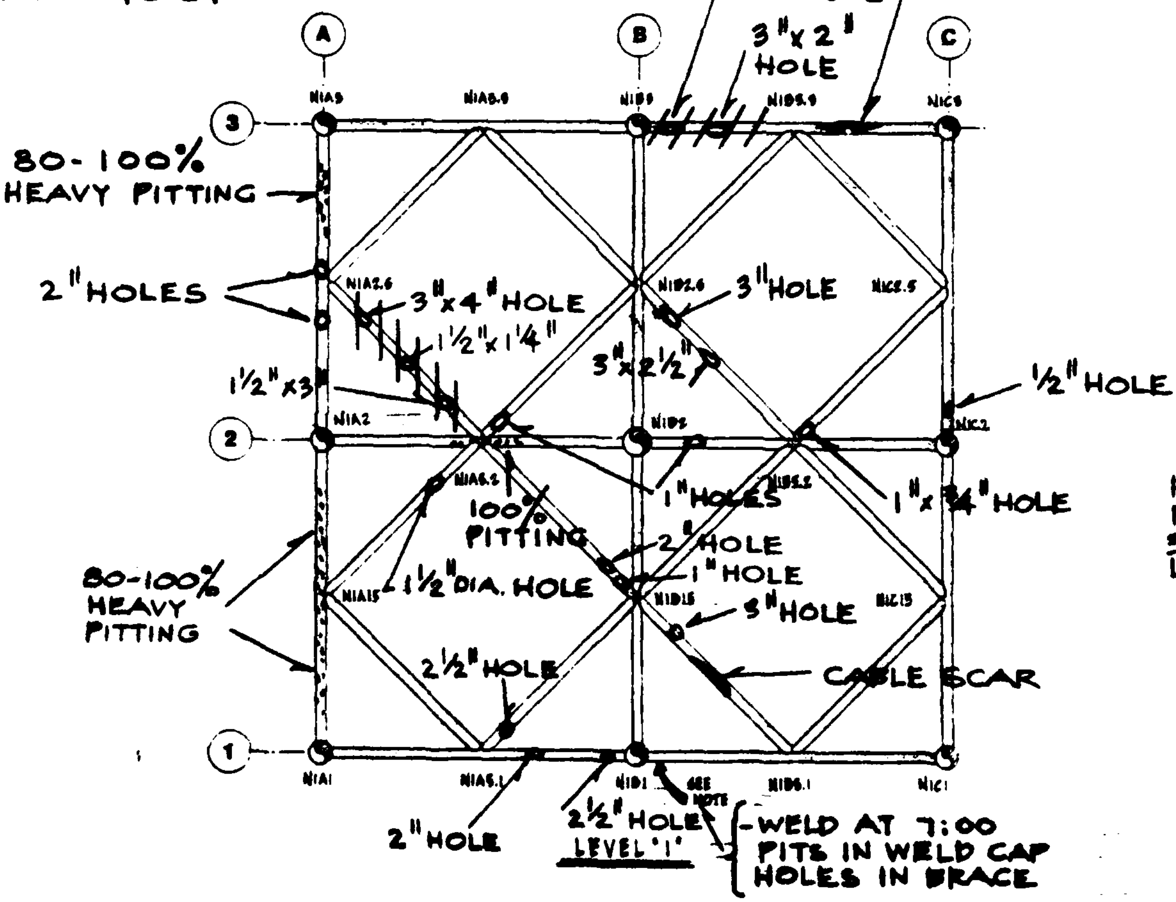
STAGE I. FACE "C" & FACE "D"



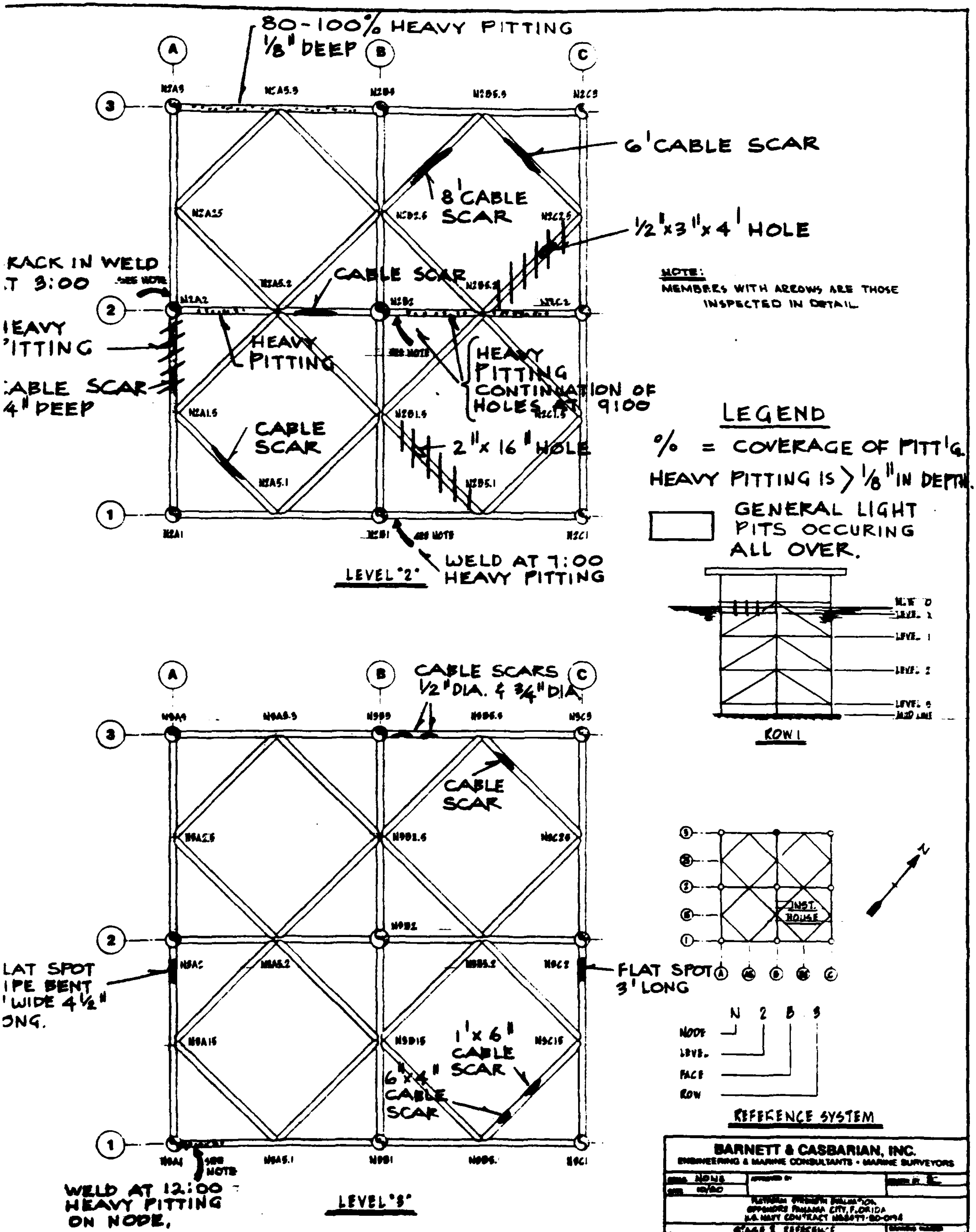
NOTE:

///// DENOTES MEMBERS REMOVED FOR STRUCTURAL ANALYSIS.

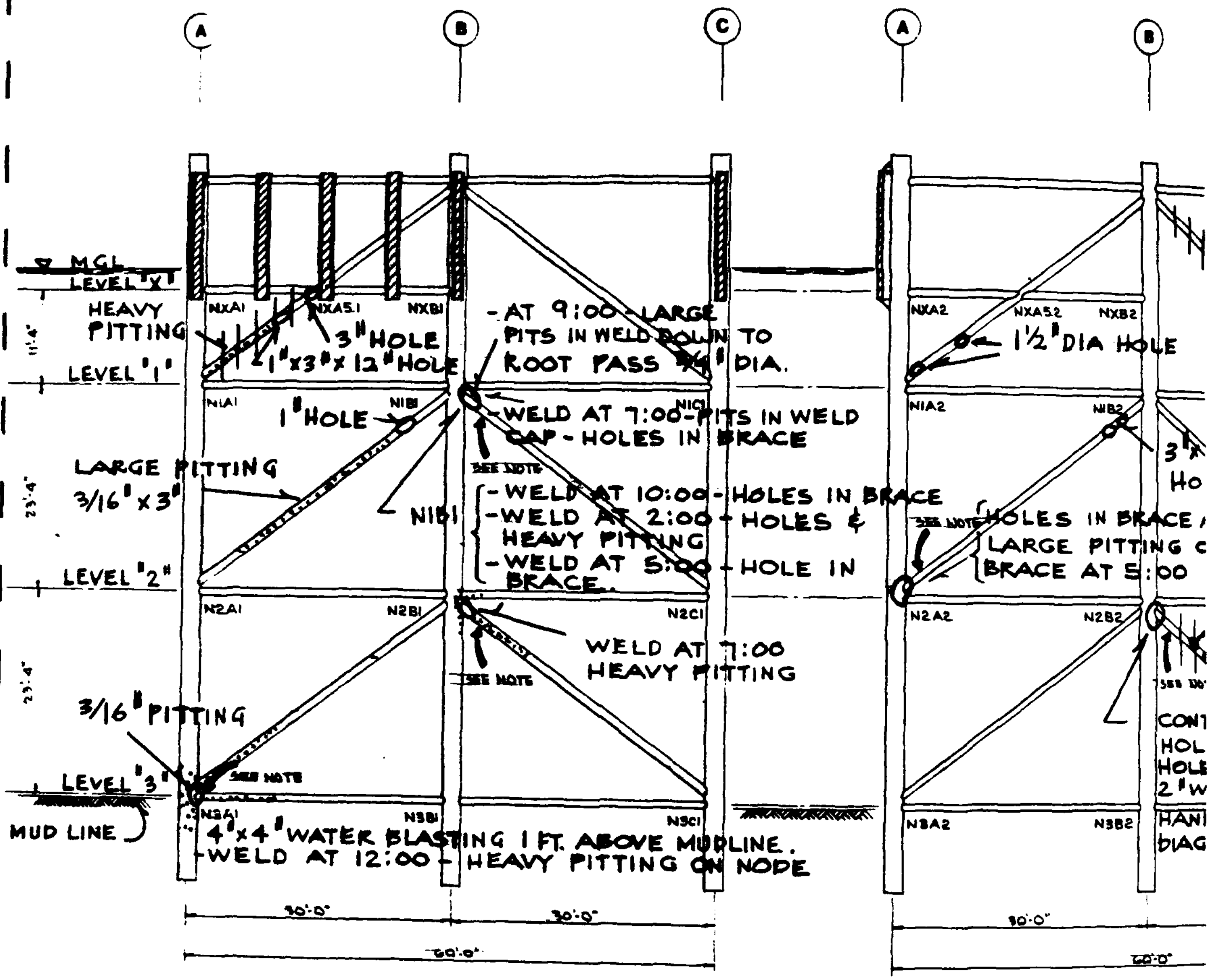
LEVEL "X"



LEVEL '1'



80-100% HEAVY PITTING
1/8" DEEP
6' CABLE SCAR
8' CABLE SCAR
1/2"x3"x4' HOLE
NOTE:
MEMBERS WITH ARROWS ARE THOSE INSPECTED IN DETAIL
RACK IN WELD
T 3:00
SEE NOTE
CABLE SCAR
HEAVY PITTING
CABLE SCAR
4" DEEP
HEAVY PITTING
HEAVY PITTING
CONTINUATION OF HOLES AT 9:00
CABLE SCAR
2"x 16" HOLE
LEGEND
% = COVERAGE OF PITT'G.
HEAVY PITTING IS > 1/8" IN DEPTH.
GENERAL LIGHT PITS OCCURING ALL OVER.
WELD AT 7:00
HEAVY PITTING
LEVEL "2"
ROW 1
CABLE SCARS
1/2" DIA. & 3/4" DIA.
CABLE SCAR
LAT SPOT
IPE BENT
' WIDE 4 1/2"
ONG.
FLAT SPOT
3' LONG
1'x 6" CABLE SCAR
6"x4" CABLE SCAR
INST. HOUSE
N 2 B 3
NODE
LEVEL
FACE
ROW
REFERENCE SYSTEM
WELD AT 12:00
HEAVY PITTING
ON NODE.
LEVEL "3"
BARNETT & CASBARIAN, INC.
ENGINEERING & MARINE CONSULTANTS • MARINE SURVEYORS
PLATFORM STRENGTH EVALUATION
OFFSHORE PANAMA CITY, FLORIDA
U.S. NAVY CONTRACT
STAGE 3, REFERENCE SYSTEM, LEVEL "X", LEVEL "1", LEVEL "2" & LEVEL "3"
BCI-008A



ROW "1"

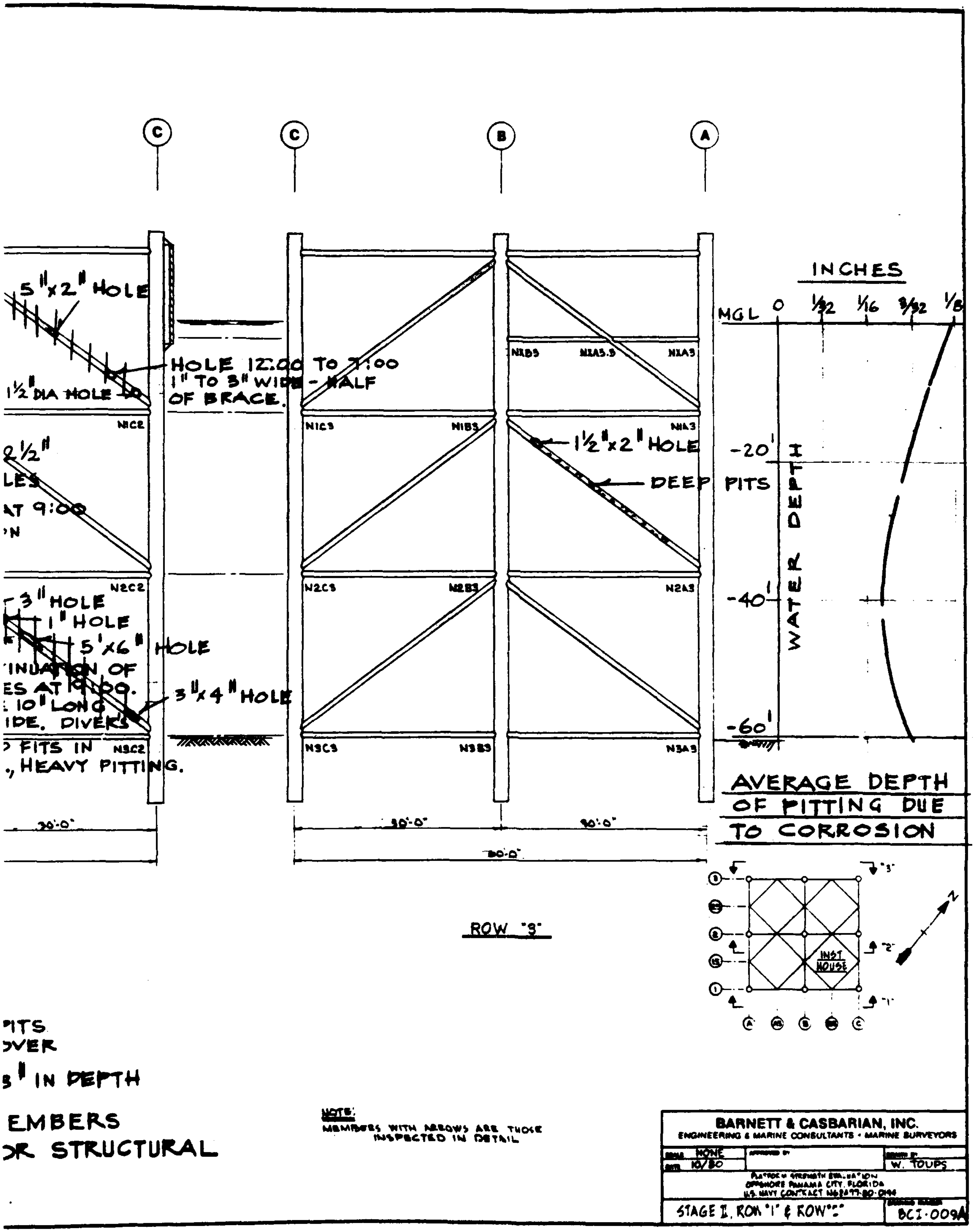
ROW "2"

LEGEND

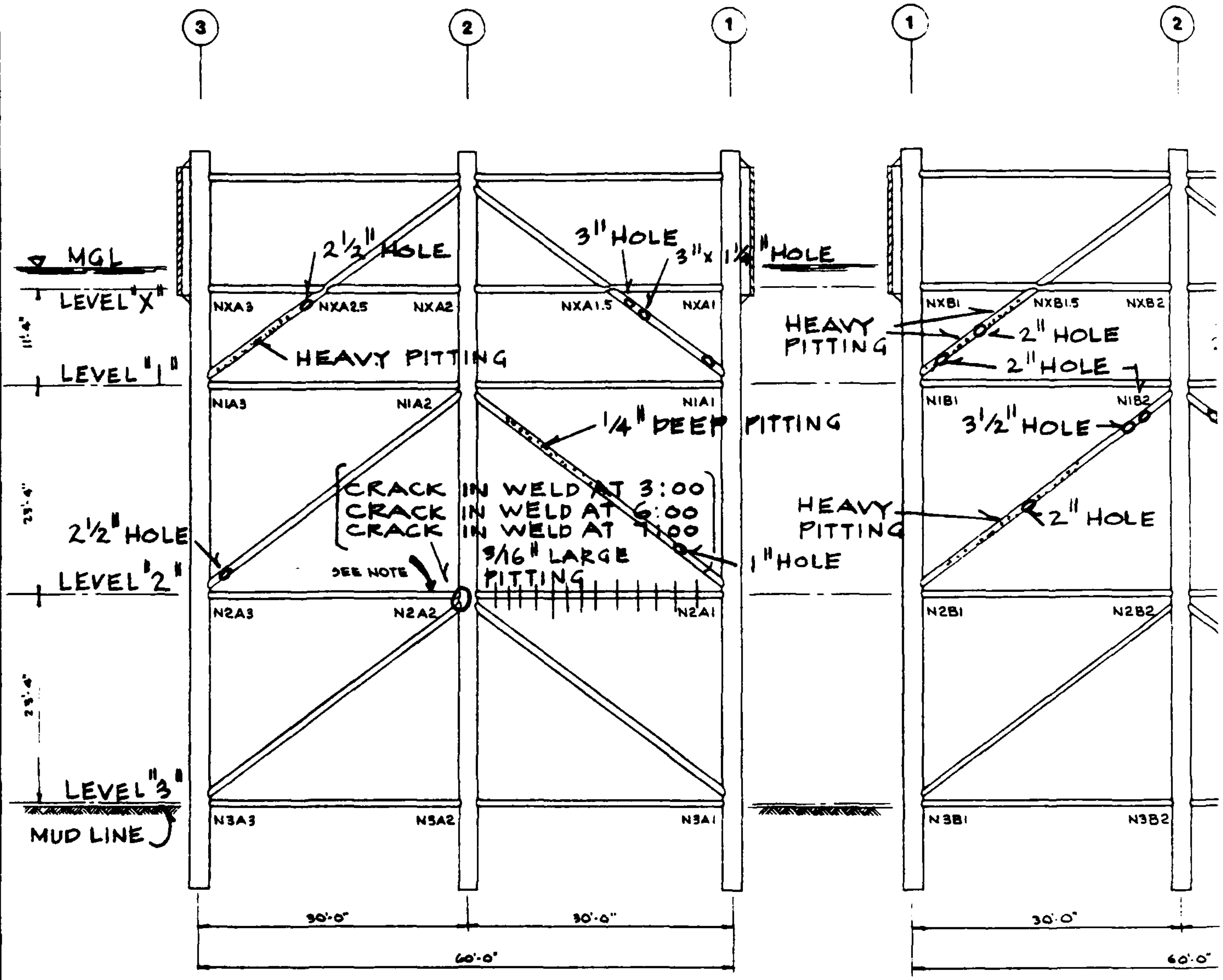
GENERAL LIGHT ... OCCURING ALL ...

HEAVY PITTING IS > 1/...

////// DENOTES M... REMOVED F... ANALYSIS.



C
C
B
A
5"x2" HOLE
HOLE 12:00 TO 7:00
1" TO 3" WIDE - HALF
OF BRACE.
1½" DIA HOLE
N1C2
N1C3
N1B3
N1A3
N1B3
N1A3.5
N1A3
1½"x2" HOLE
DEEP PITS
2½"
LES
AT 9:00
N
N2C2
N2C3
N2B3
N2A3
3" HOLE
1" HOLE
5'x6" HOLE
INUATION OF
ES AT 10:00.
10" LONG
IDE. DIVERS
3"x4" HOLE
FITS IN
N3C2
N3C3
N3B3
N3A3
, HEAVY PITTING.
30'-0"
30'-0"
30'-0"
60'-0"
INCHES
MGL
0
1/32
1/16
3/32
1/8
-20'
-40'
-60'
WATER DEPTH
AVERAGE DEPTH
OF PITTING DUE
TO CORROSION
ROW "3"
INST HOUSE
N
PITS
OVER
" IN DEPTH
EMBERS
R STRUCTURAL
NOTE:
MEMBERS WITH ARROWS ARE THOSE INSPECTED IN DETAIL
BARNETT & CASBARIAN, INC.
ENGINEERING & MARINE CONSULTANTS · MARINE SURVEYORS
NONE
10/80
W. TOUPS
PLATFORM STRENGTH EVALUATION
OFFSHORE PANAMA CITY, FLORIDA
U.S. NAVY CONTRACT N62477-80-C-0196
STAGE II, ROW "1" & ROW "3"
BCI-009A

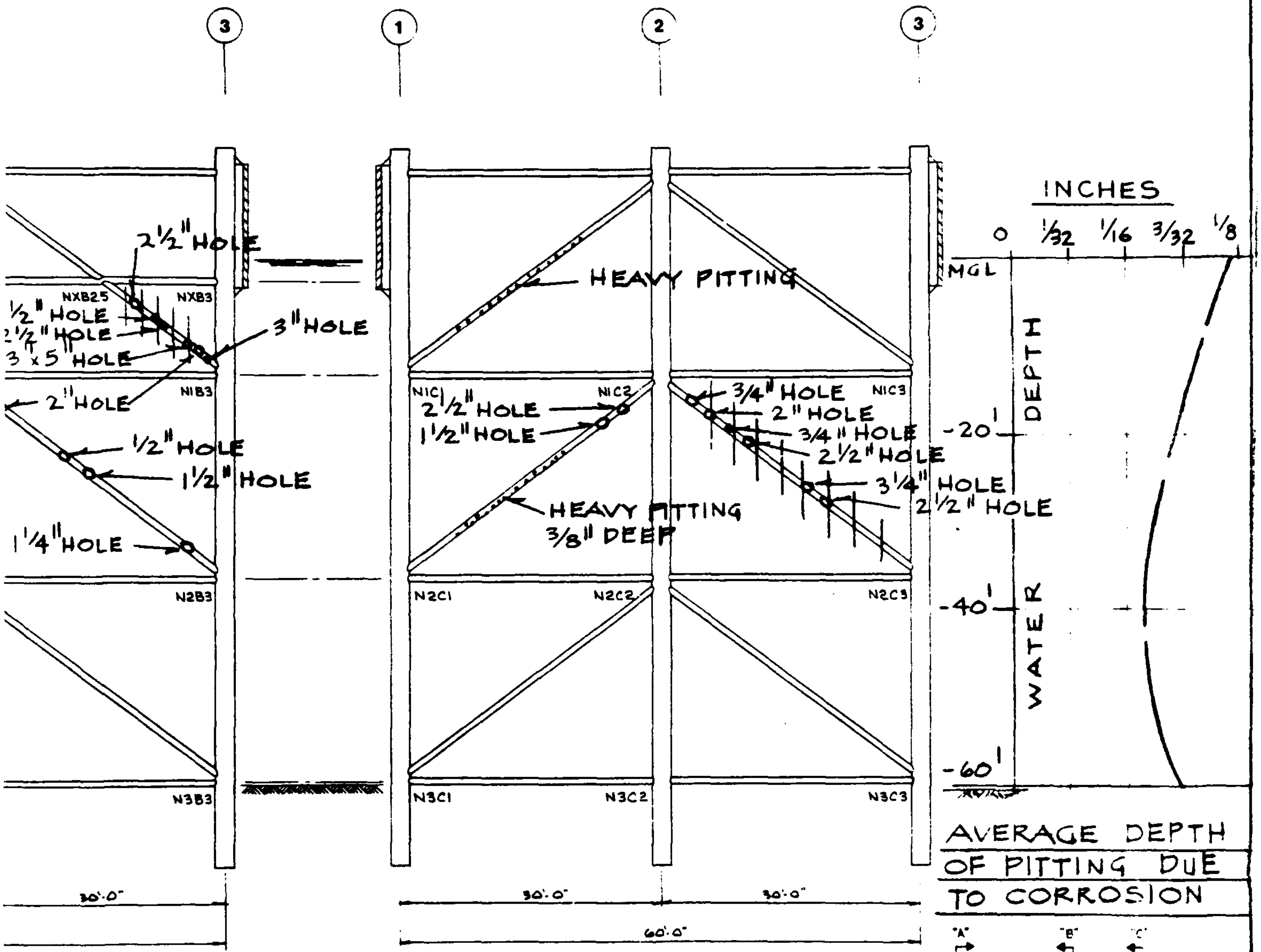


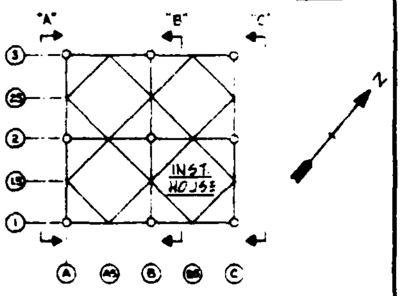
FACE "A"

FACE "B

NOTE:

\\\\\\ DENOTES MEMBERS REMOVED FOR STRUCTURAL ANALYSIS.





FACE "C"

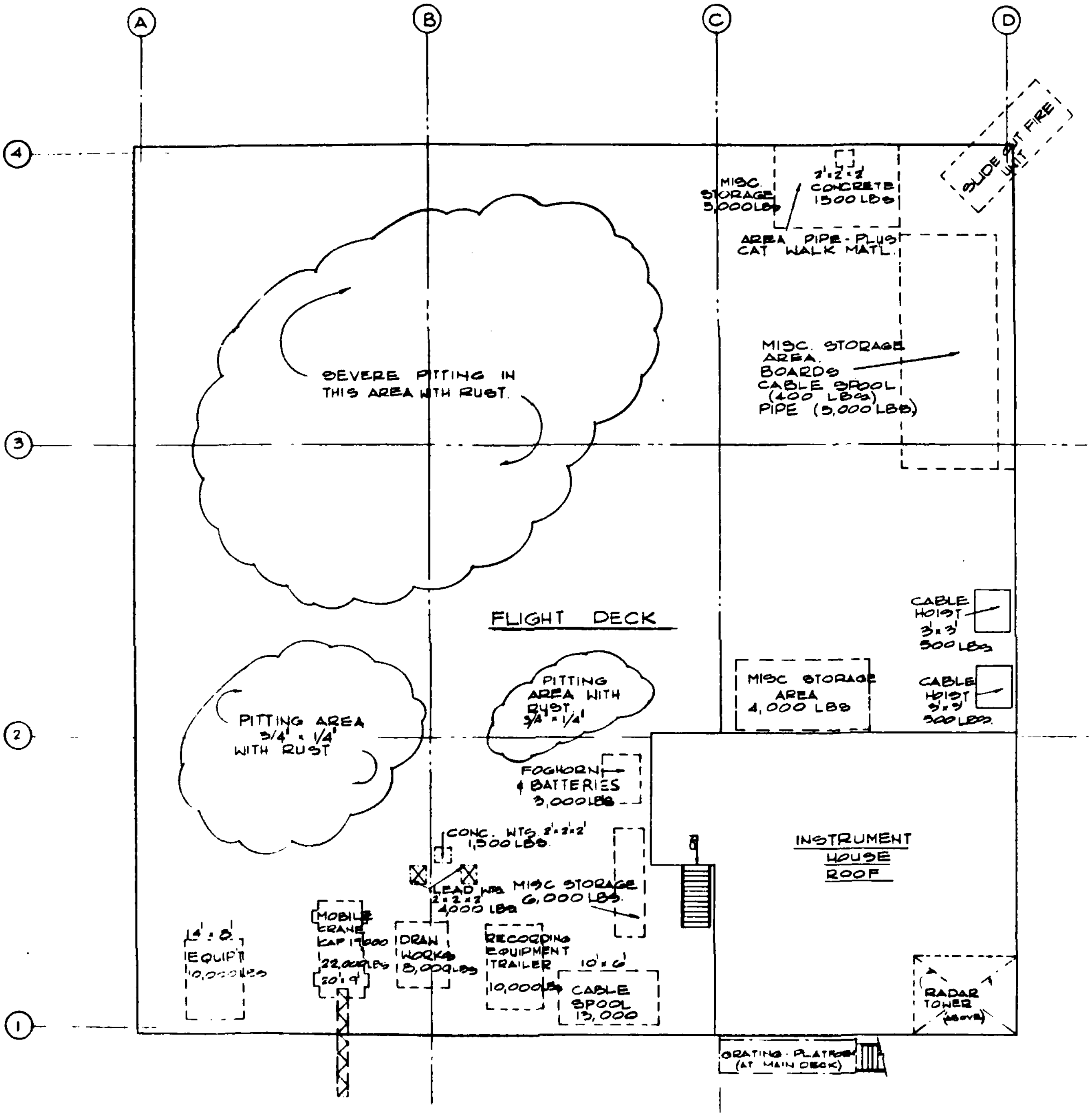
LEGEND

HEAVY PITTING IS > 1/8" IN DEPTH

GENERAL LIGHT PITS OCCURING ALL OVER

NOTE:
MEMBERS WITH ARROWS ARE THOSE INSPECTED IN DETAIL.

BARNETT & CASBARIAN, INC. ENGINEERING & MARINE CONSULTANTS • MARINE SURVEYORS	
SCALE NONE	DRAWN BY W. TOUPS
DATE 10/80	
PLATFORM STRENGTH EVALUATION OFFSHORE PANAMA CITY, FLORIDA US NAVY CONTRACT N62477-80-[illegible]	
STAGE I FACE "A" & FACE "B"	DRAWING NUMBER [illegible]



PLAN OF FLIGHT-DECK & INSTRUMENT-HOUSE ROOF

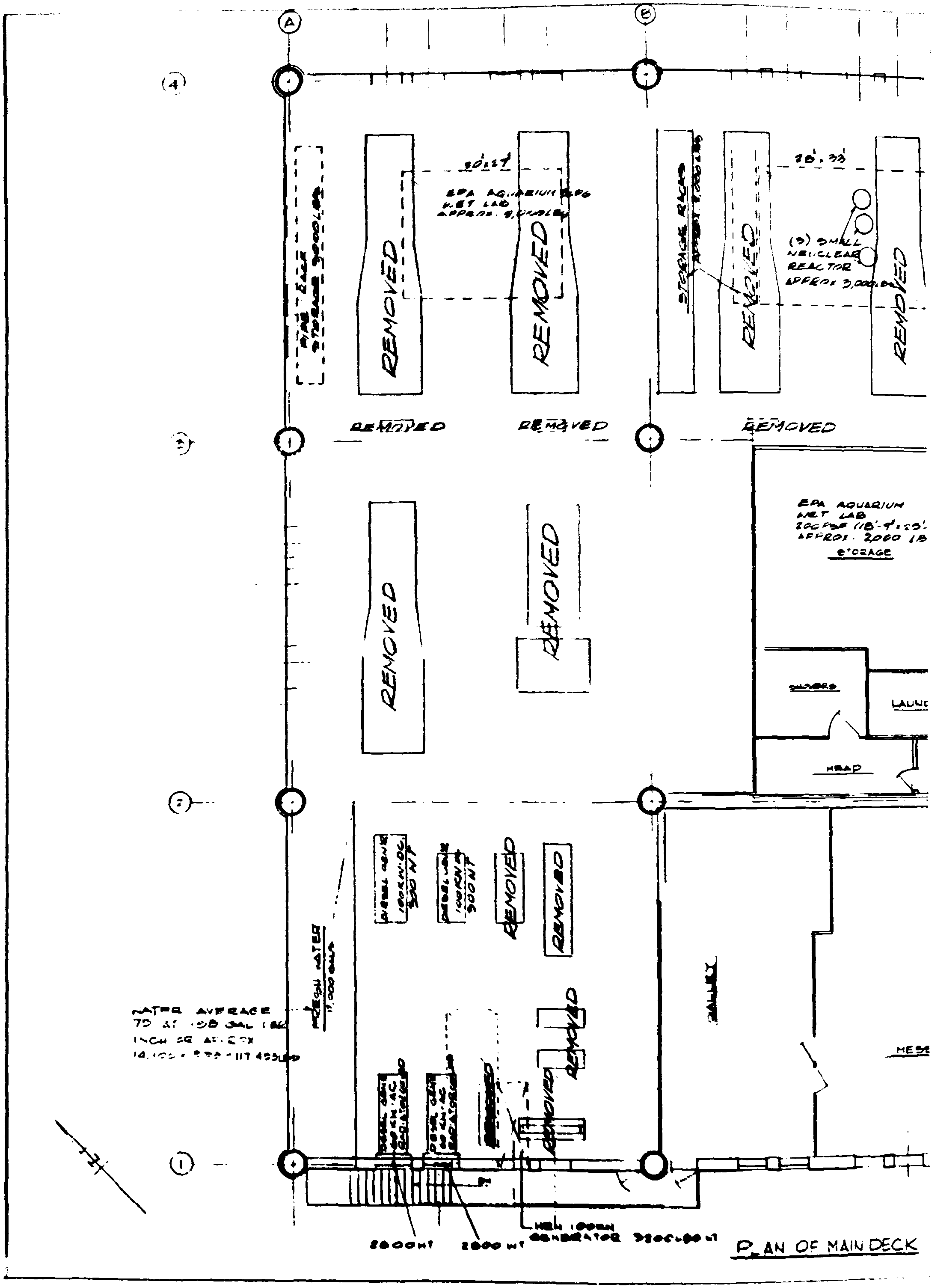
SCALE: 1/8"=1'-0"

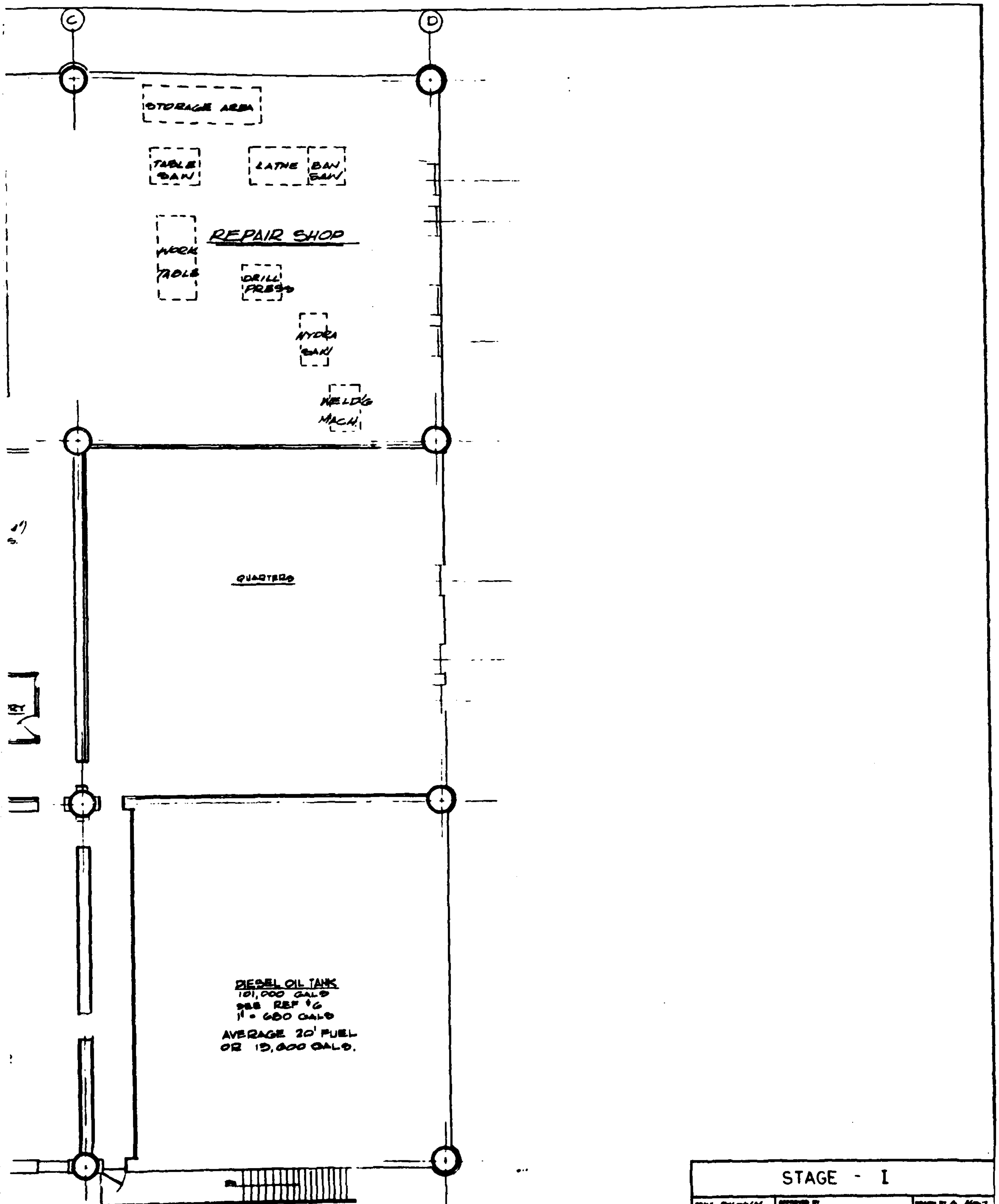
STAGE - I

SCALE SHOWN	APPROVED BY	DRAWN BY H.Hop
DATE 5-24-1961		

PLAN OF FLIGHT DECK AND
INSTRUMENT - HOUSE ROOF

BCI - 011

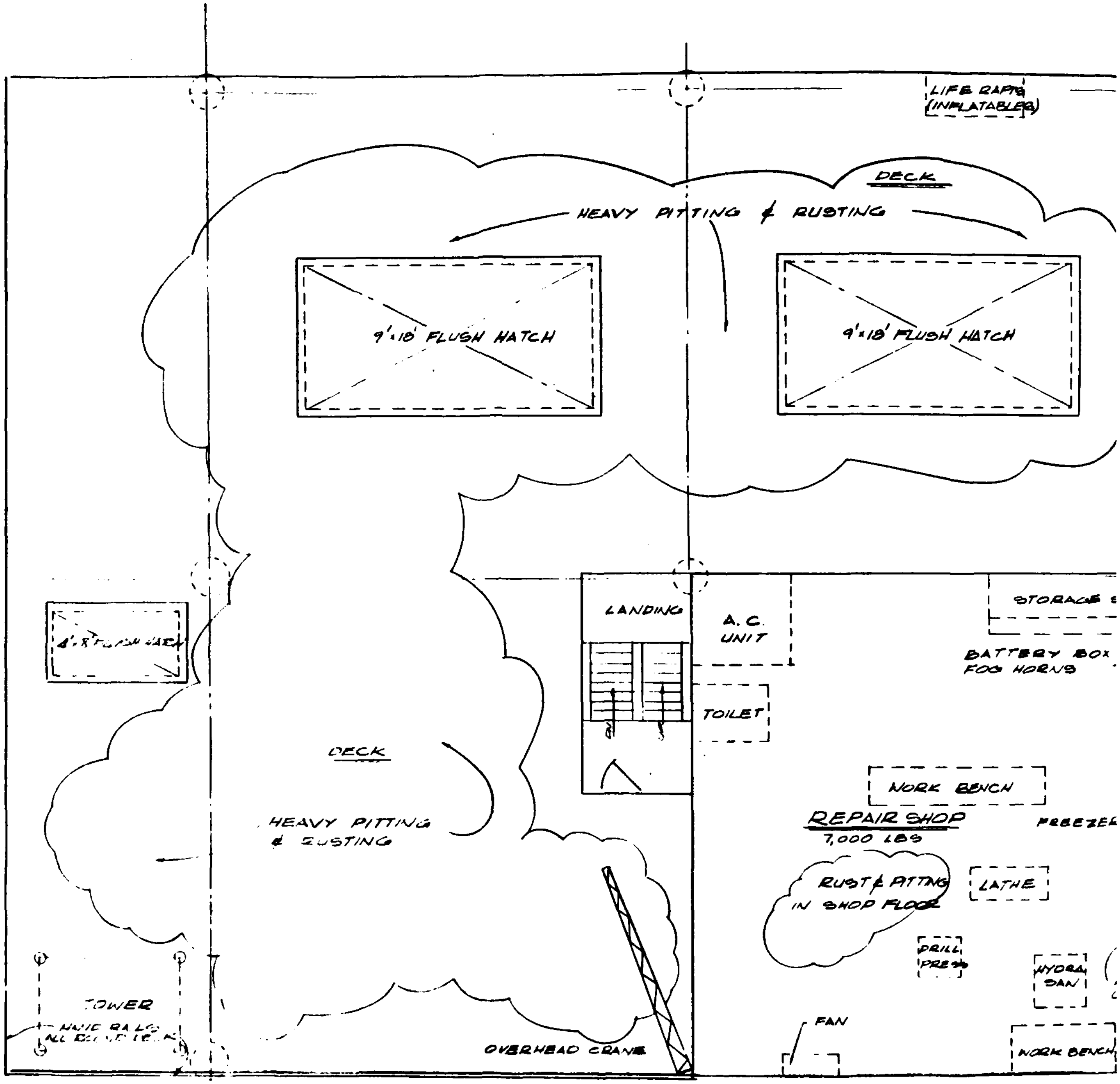

REMOVED
EPA AQUARIUM WET LAB
STORAGE
SHOWERS
HEAD
GALLEY
FRESH WATER
PLAN OF MAIN DECK



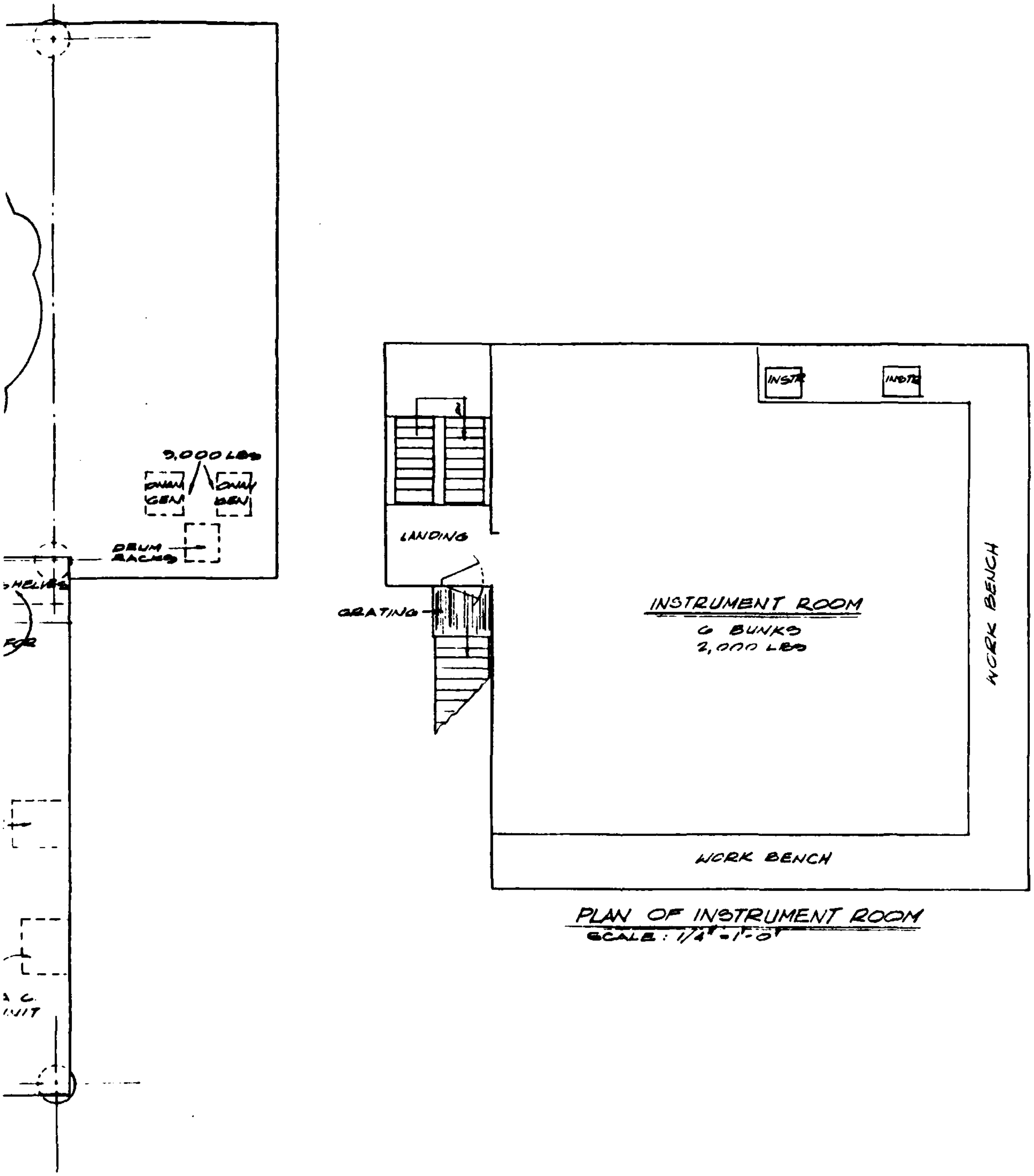
STAGE - I

PLAN OF MAIN DECK

BCI 012



PLAN OF UPPER DECK AND REPAIR SHOP
SCALE: 1/4" = 1'-0"



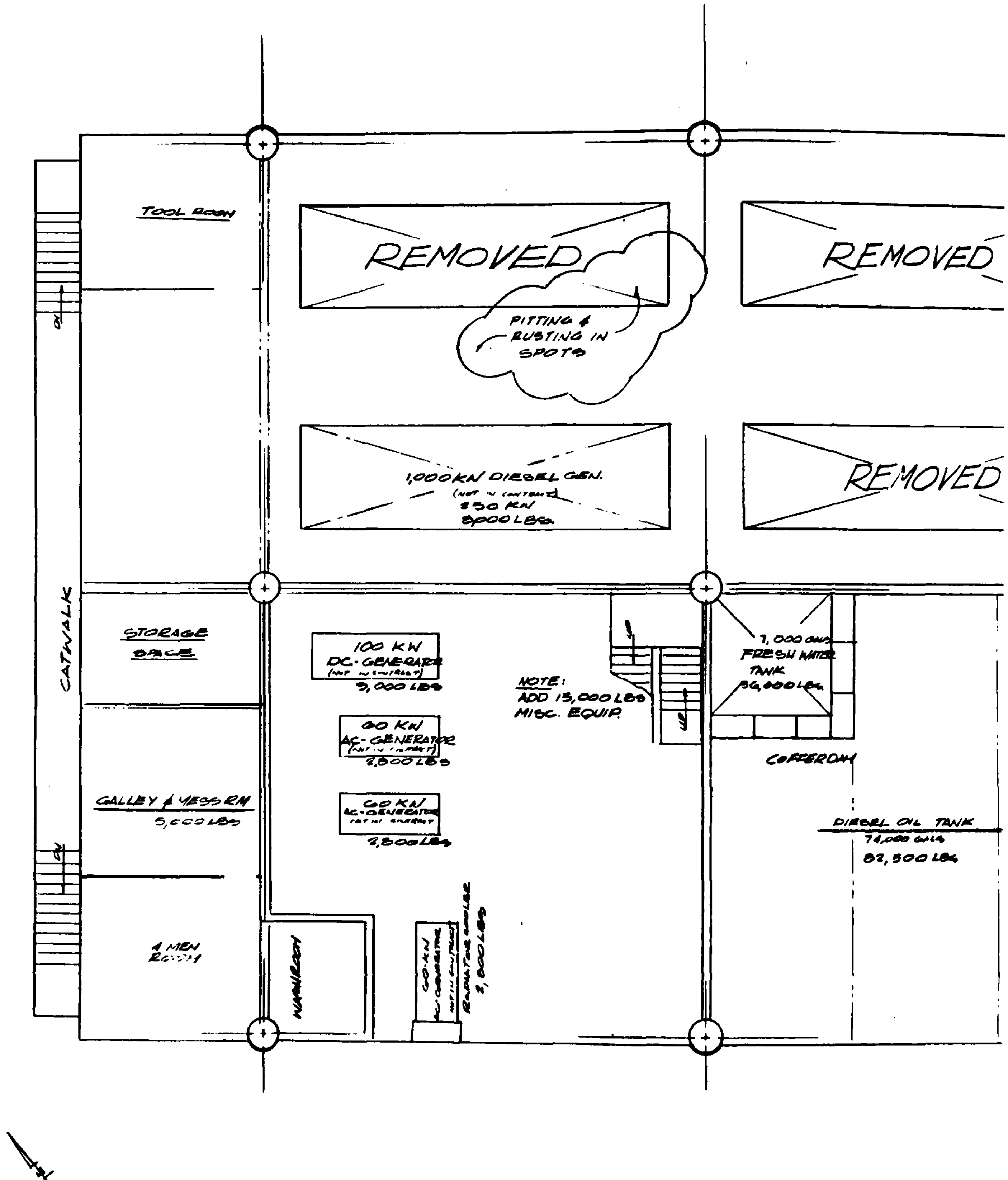
PLAN OF INSTRUMENT ROOM
SCALE: 1/4" = 1'-0"

STAGE - II

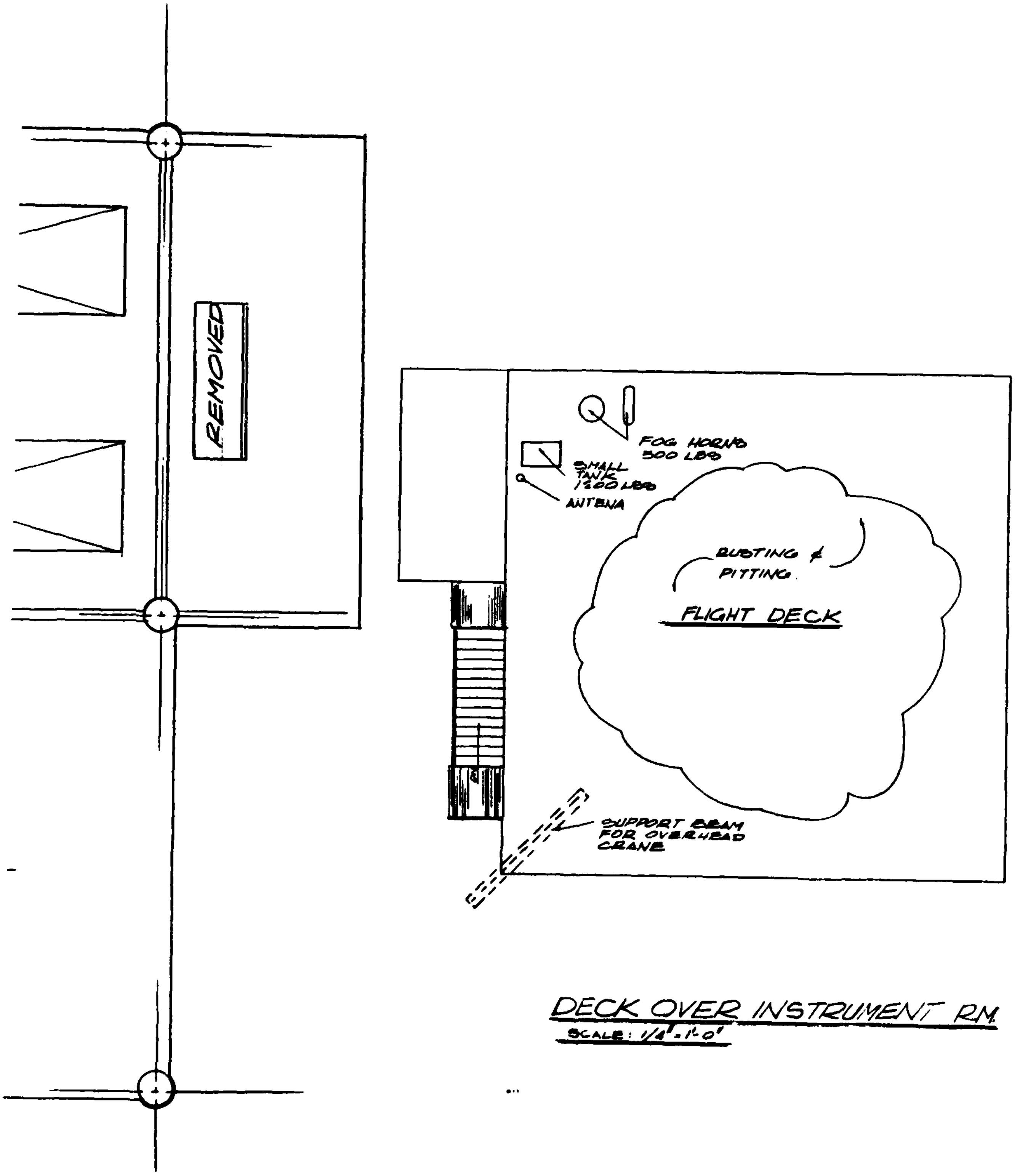
SCALE: SHOWN

PLAN OF UPPER DECK & REPAIR SHOP.
PLAN OF INSTRUMENT ROOM.

ECT - 013



MAIN DECK PLAN
SCALE: 1/4"=1'-0"



DECK OVER INSTRUMENT RM.

SCALE: 1/4" = 1'-0"

STAGE - II

SCALE SHOWN | DATE 3-24-92 | APPROVED BY | DRAWN BY N. HGO

MAIN DECK PLAN.
DECK OVER INSTRUMENT RM.

DRAWING NUMBER BCI - 014

Stage I platform with leg D-1 in foreground. Row 1 is to the left and Row D is to the right.

Fig. 2.1.0

Two views of flight deck. Where deck paint has flaked off, general pitting corrosion is evident, especially in low spots. Pits in some areas are 1 inch in diameter and up to 1/4 inch deep.

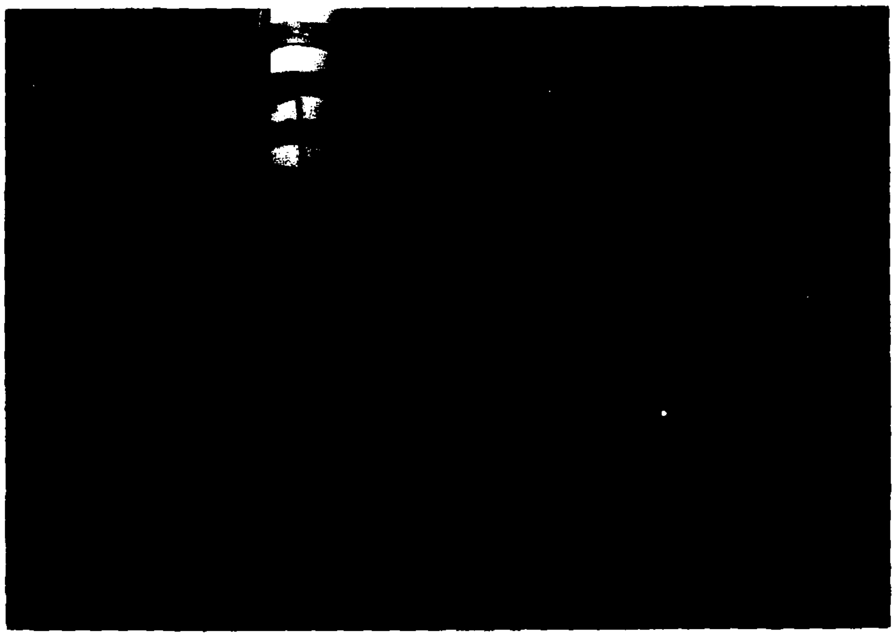
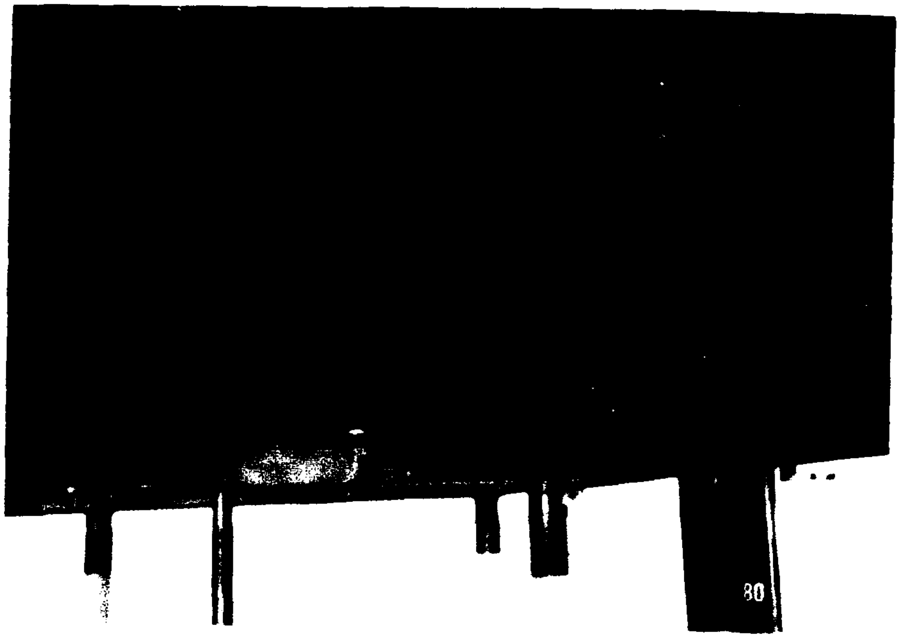


Fig. 2.1.1



The deck beams are in good condition generally, but moisture on the horizontal planes of the H-beams has caused rust and pitting throughout. The close-up below of the vertical deck beam supports shows typical undercut welds locally pitted and corroded.

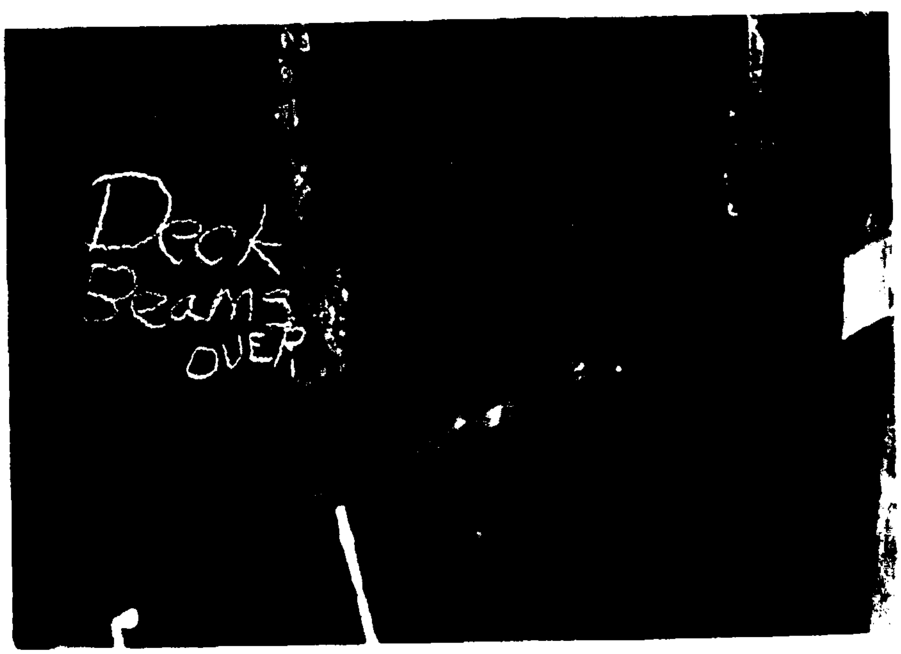
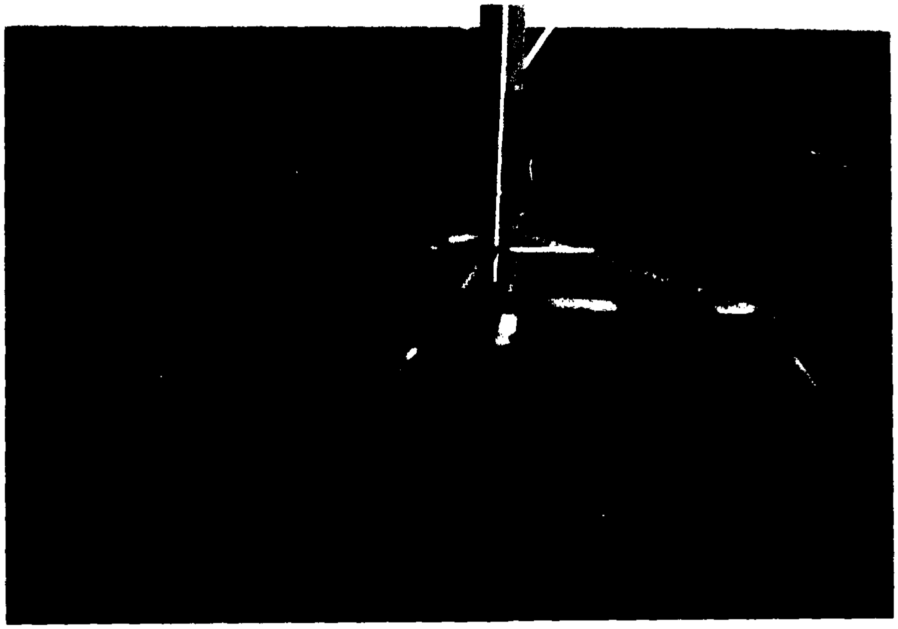


Fig. 2.1.2



Above, at leg A-4, note corrosion products at junctions of white angle iron and horizontals and heavy rust on leg above flange between deck section and jacket. Horizontal members at the +10' elevation are monel-cladded.

Below, view from D-1/D-2 to A-1/A-2. Lines to hanging anodes are visible. Where original angle irons have been removed, holes remaining in the horizontals are unrepaired.

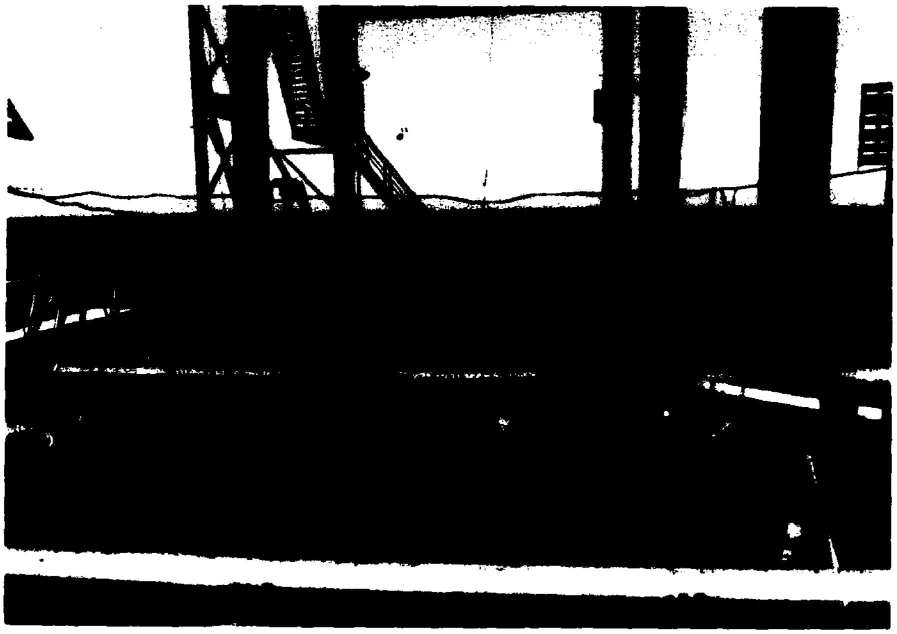


Fig 2.1.3

Above, jacket level at +10' viewed from D-1 toward D-2. Stairway corrosion extends up 5 steps and includes localized areas that are rusted through. Also note collapsed handrail in background.

Below, boat bumper between A-1 and A-2 covered with rust blisters.

Fig. 2.1.4

Two views of inboard side of leg D-1 just above the +10 feet level showing locally heavy corrosion damage. Circled area to left in lower photo is a large pit 3/8 inch deep. "CAP" indicates a span 4 inches long where the girth weld is deteriorated to flush with the adjacent base metal.

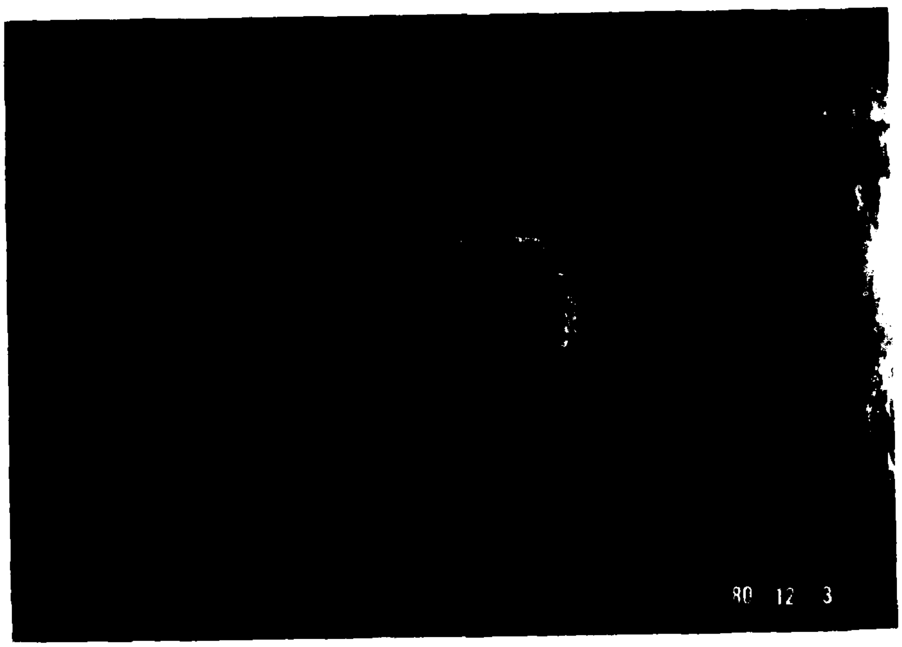
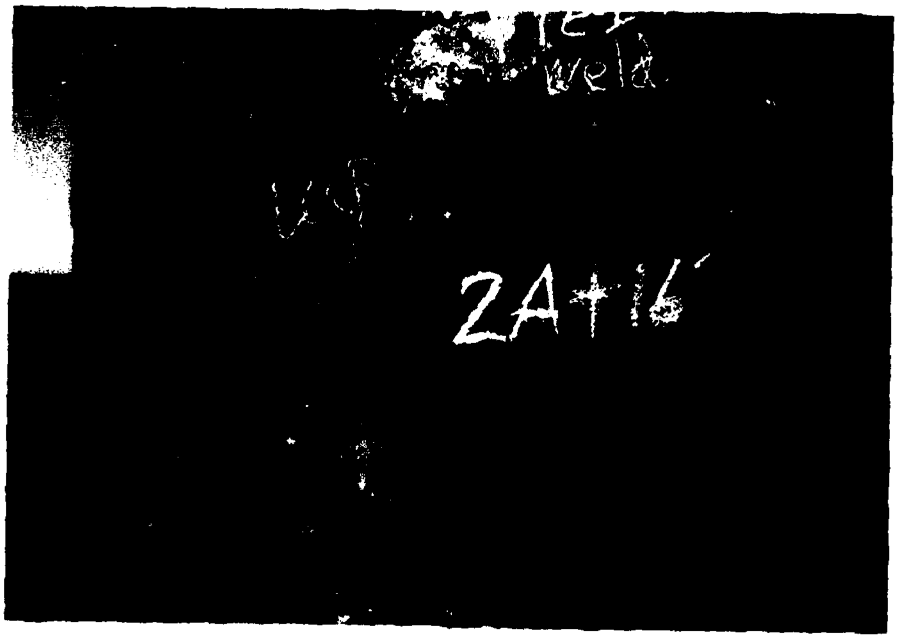
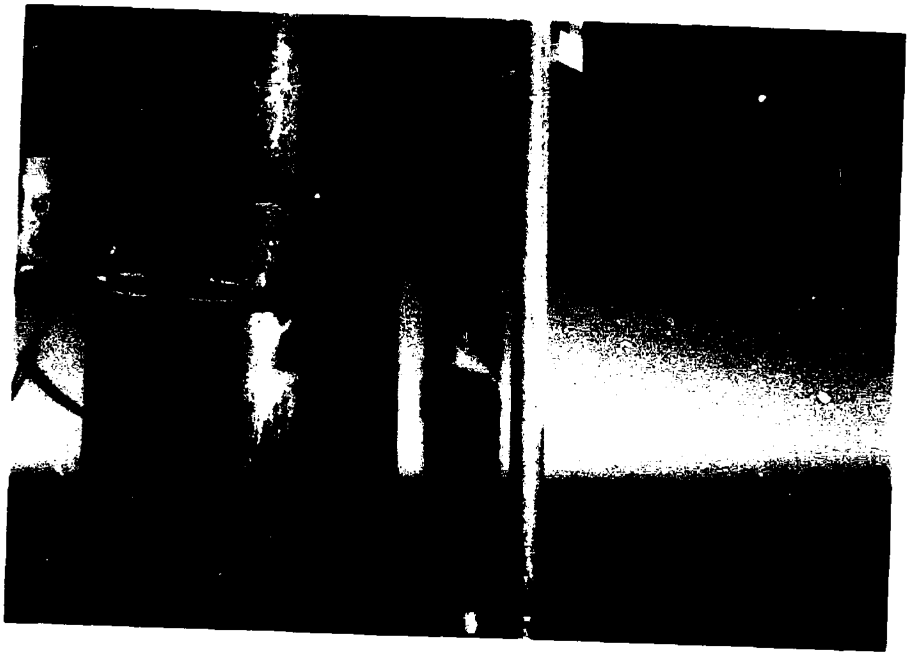


Fig. 2.1.5



Views of extensive corrosion damage on leg A-2. Span of deteriorated weld shown above is approximately 6 inches long. Lower photo shows increased metal loss in splash zone at +10 feet level. Where rust was scrapped from this weld, the cap and some of the filler metal fell away from the weld.

Fig. 2.1.6



Leg D-2 with area 2 feet square shown in both photos. Circled area within it is 1/4 inch deep. Upper photo shows shackle and padeye which is reported to have lost 1/4 inch of metal thickness. The thin-walled pipe adjacent to the leg has been penetrated by corrosion.

Fig. 2.1.7

Above, piece of rust 3 inches in diameter and 1/4 inch thick is held to right of area from where it has been removed at +16 feet on B-3. Pit beneath rusted area is another 1/4 inch deep.

Leg B-3 at +14 feet. Circled area includes rust blisters and loss of some of the cap on the girth weld. Water was trapped between the broken paint surface and rusted base metal.

Fig. 2.1.8

Above, at A-3 near +16 feet, locally heavy base metal loss. Two spans of longitudinal seam weld 3 inches long are deteriorated to flush with adjoining base metal.

Below, at leg B-2, large, localized areas of base metal loss and some loss of weld metal at the junction of the deck section with the jacket.

Fig. 2.1.9

Horizontal on the +10 feet level between A-2 and A-3, where the jackets are joined by a severely deteriorated weld. The base metal of the "B" jacket horizontal is also heavily corroded, as is that of the horizontal to B-3.

Horizontal brace at +10 feet level between B-2 and B-3. Most of the cap is pitted on the girth weld and sheets of rust are falling away from the base metal of the brace where it is corroded.

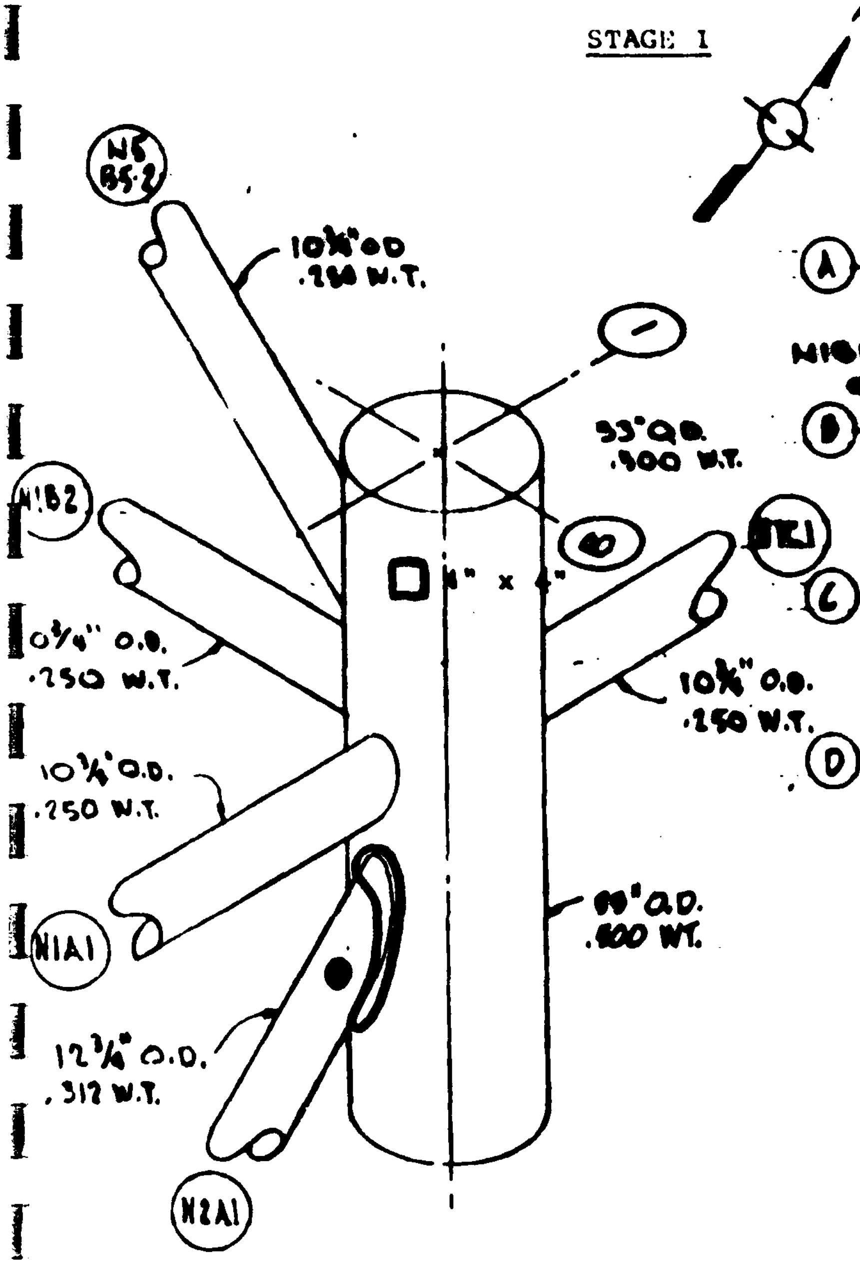
Fig. 2.1.10

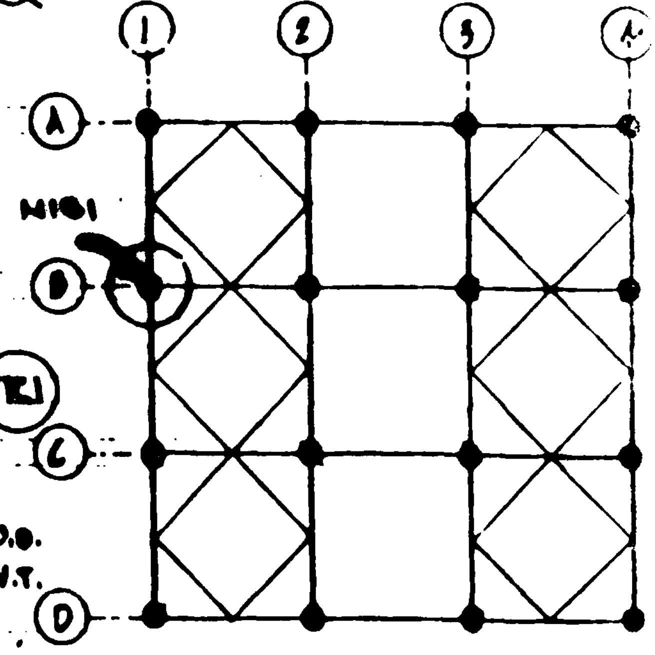
Above, Leg D-1, where severe corrosion covers the area just above the monel. The boat bumper is rusted and distorted by collisions and the timber pad has dropped away.

Below, Leg A-3 base metal loss at the +10 feet level is 1/4 inch deep in the area circled.

Fig. 2.1.11

STAGE 1





KEY PLAN
LEVEL "1"

WELD No:	N1B1
DATE CLEANED:	12/5/80
DIVERS NAME:	G. Frost
VISUAL INSP. DATE:	12/5/80

CP 654
Bio-Fouling 1"

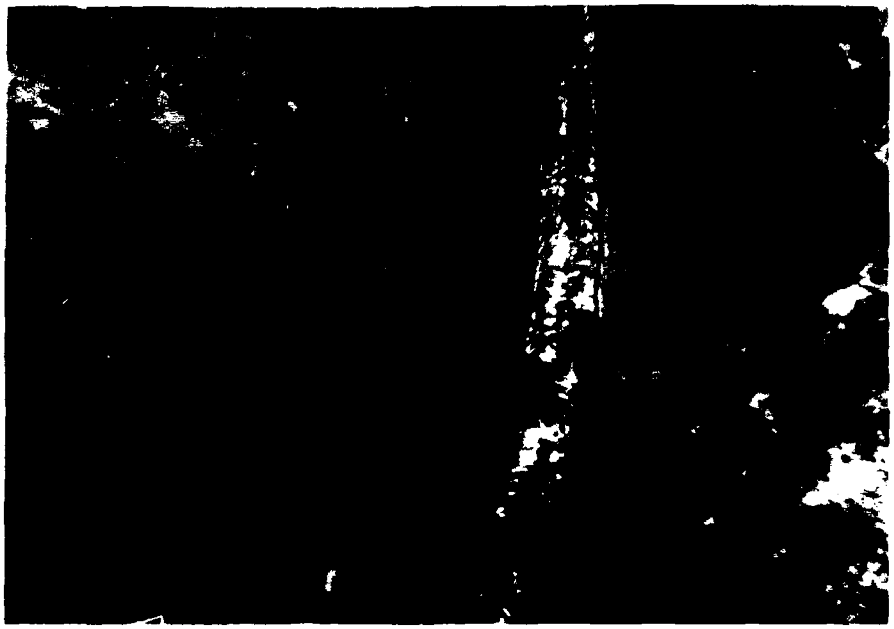
Large pits at 5:00 and 6:00
Weld cap eaten away 2" at 6:00
3/16" deep pit in brace

Weld at 10:00
Large pits and under cut in wel.

4" x 4" sq.
Pit 3/8" deep ½" dia.

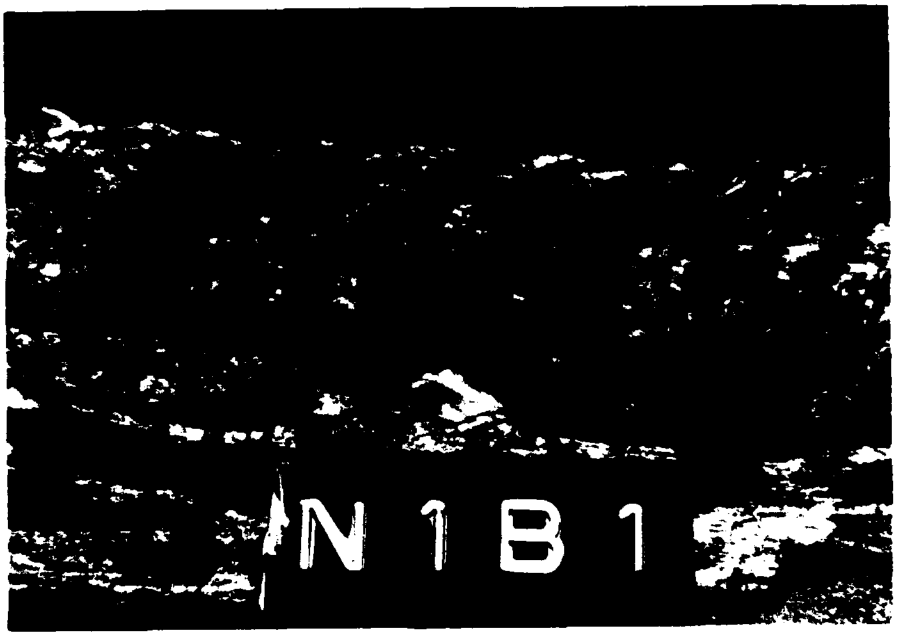
The sketch shows in yellow, areas on leg B-1 and at the B-1 junction of the brace down to N2A1, which are illusrtated on the following pages. This is the format used for documentation of the seven locations selected for inspection. Clock-face designations are used to describe locations of the junctions of the braces. For example, the 3:00 side of the vertical diagonal junction is indicated by a star.

Fig. 2.1.12



The level 1 junction of the B-1 brace down to N2A1 between 5:00 and 6:00 (above). The cap of the weld is deteriorated in a 2 inch span near 6:00. The pit in the brace near the cap weld loss is 3/16 inch deep. Lower photo shows upper 9:00 side of same weld and undercutting on the brace side of it as well as base metal loss in leg and brace.

Fig. 2.1.13



Close-ups of same N1B1 weld. Upper photo shows pitting and under-cutting in weld. The photo below is of 4:00 portion of weld where weld is undercut on brace side.

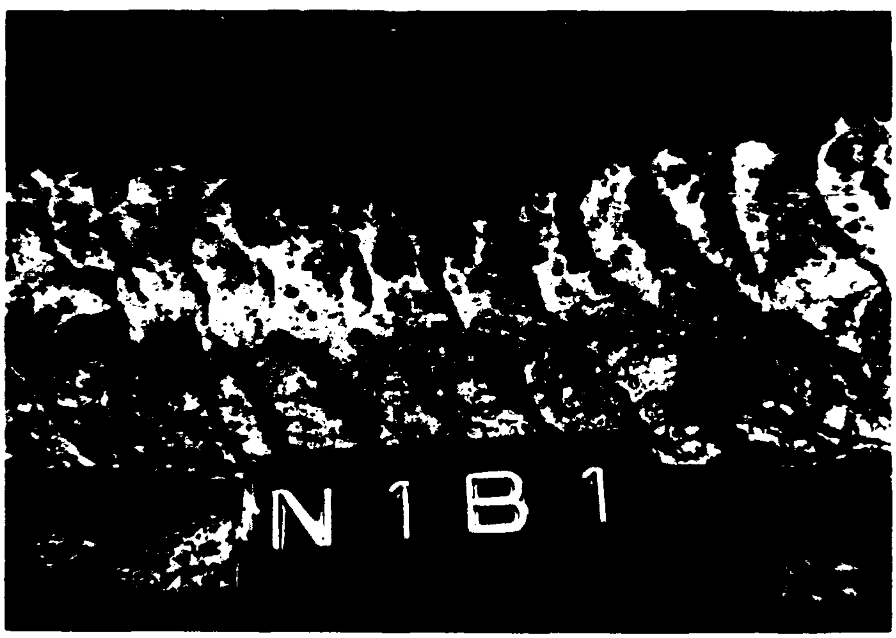


Fig. 2.1.14

The cleaned area on leg B-1 shown in wide-angle and close-up views. The pit shown below is 3/8 inch deep and 1/2 inch in diameter.

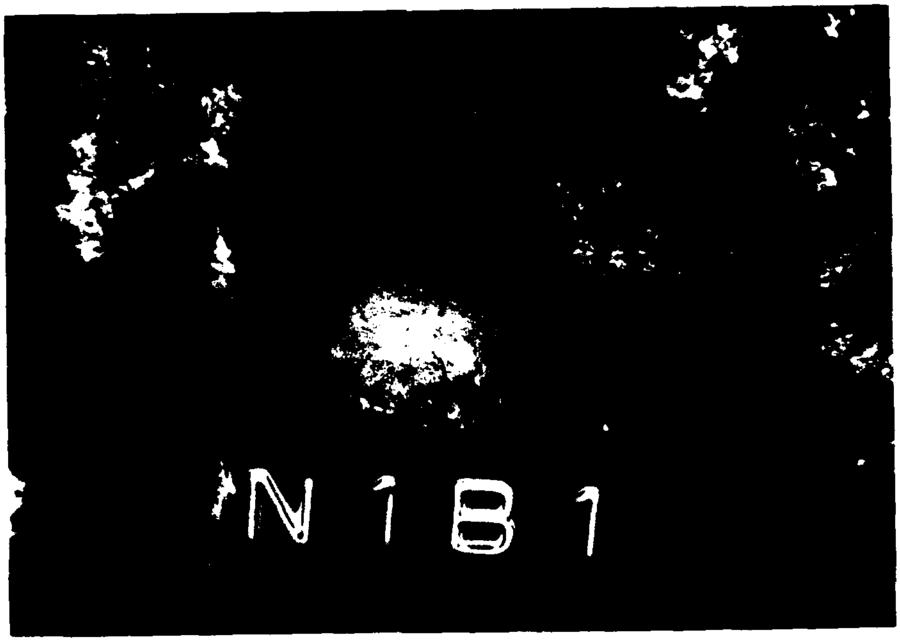
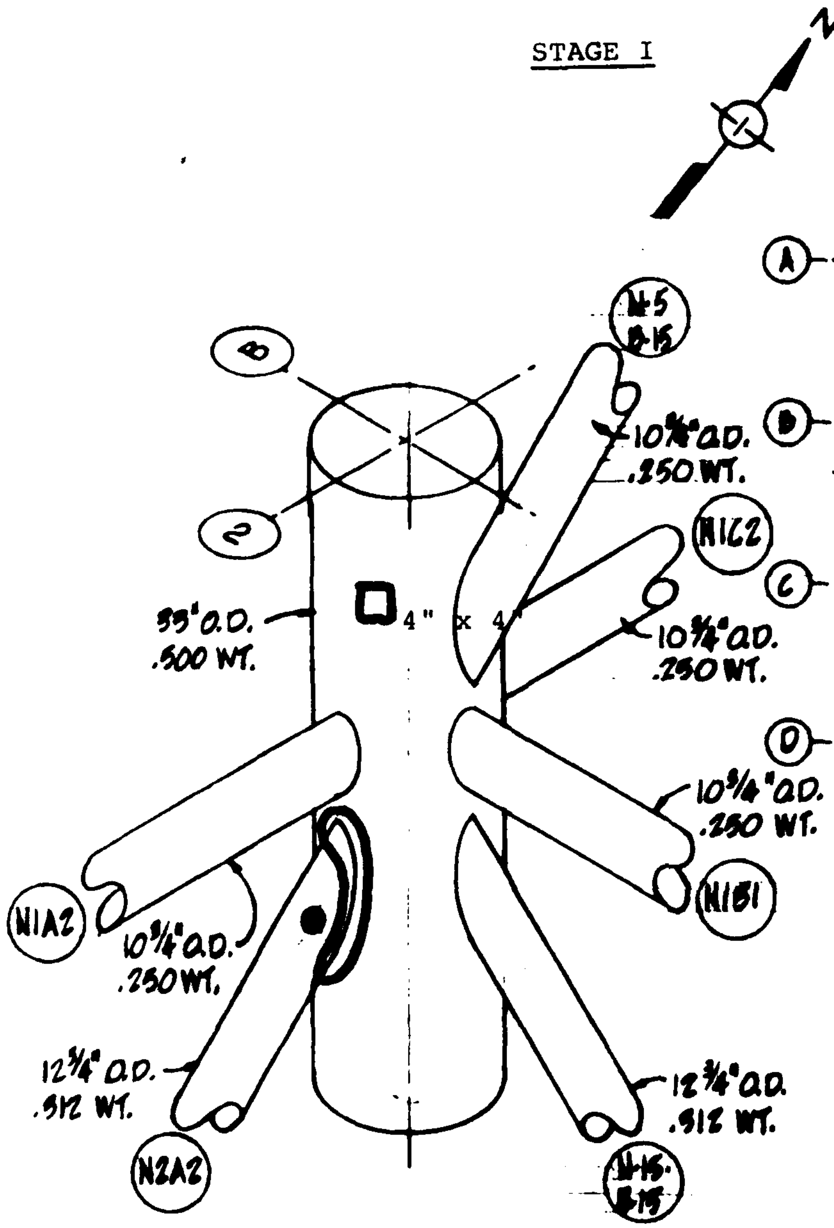
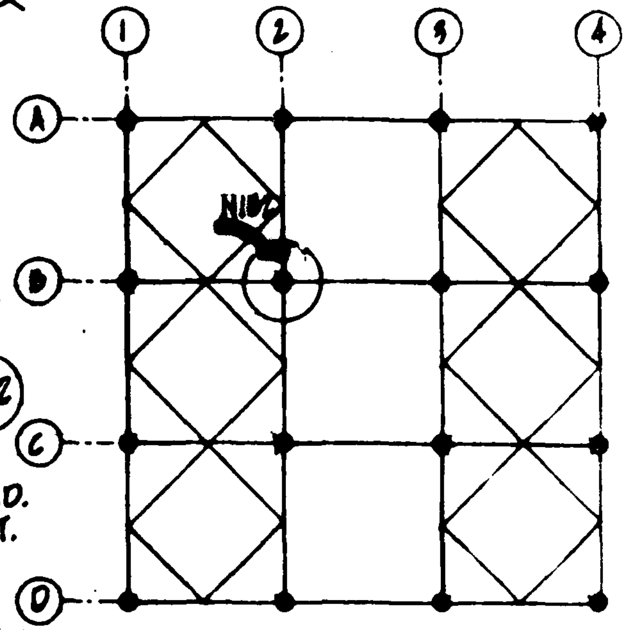


Fig. 2.1.15

STAGE I





KEY PLAN
LEVEL "1"

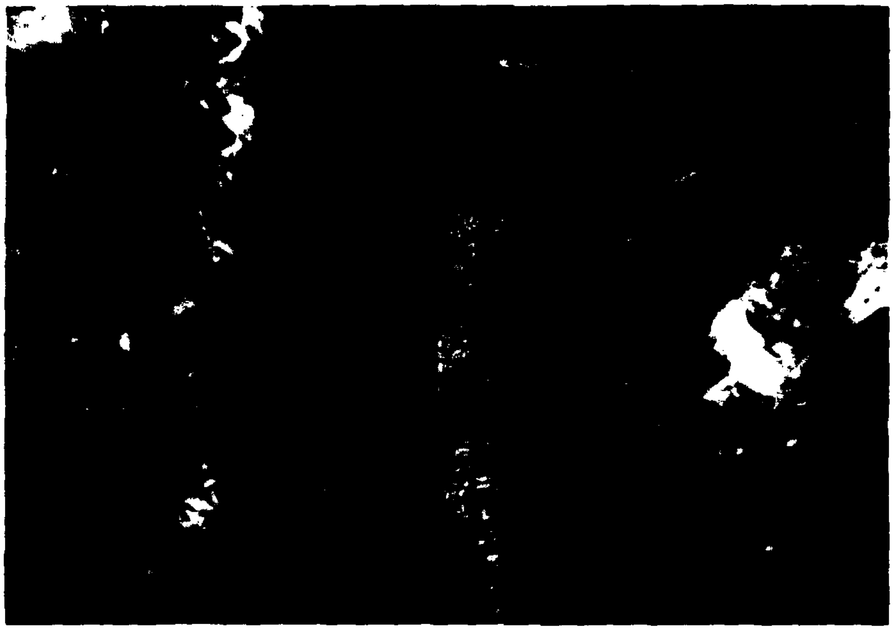
WELD NO:	N1B2
DATE CLEANED:	12/5/80
DIVERS NAME:	G. Frost
VISUAL INSP. DATE:	12/5/80

CP 653
Bio-Fouling 1-5/8"

Pits in weld at 7:00
Large pit ¼" deep ½" dia.

Weld at 8:00
Numerous pits 1/8" to 3/16" deep

Fig. 2.1.16



The level I junction of the B-2 brace down to N2A2 on the 9:00 side (above) and on the 3:00 side (below). The numerous pits near 8:00 are 1/8 to 3/16 inch deep.

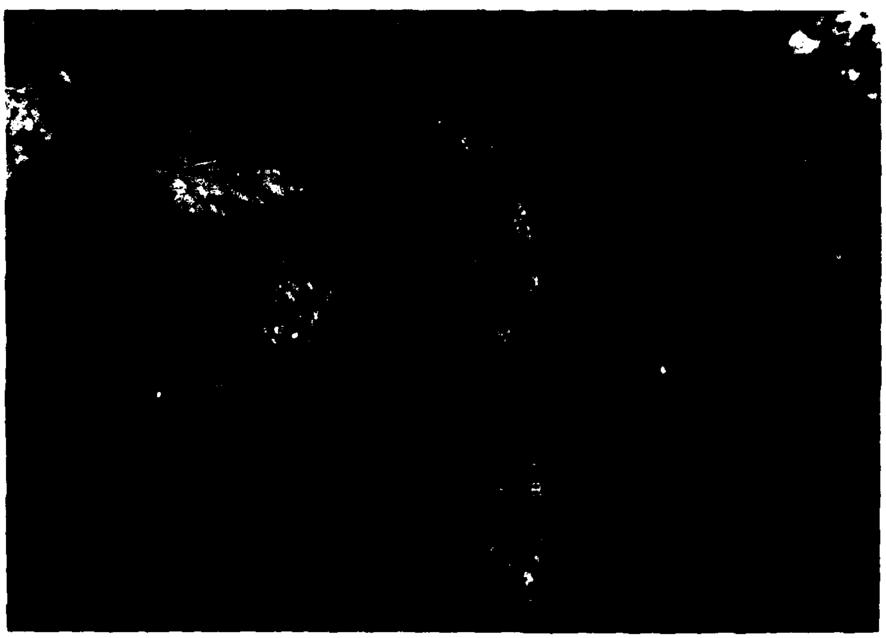
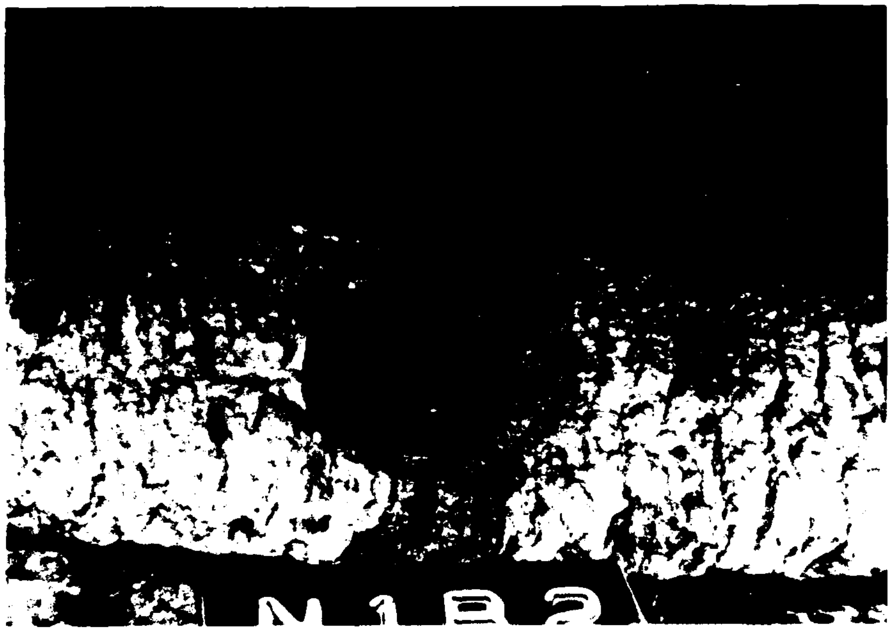


Fig. 2.1.17



Above is close-up of the largest of the pits near 8:00, which is 1/4 inch deep and 1/2 inch in diameter. Below is the 3:00 portion of weld.

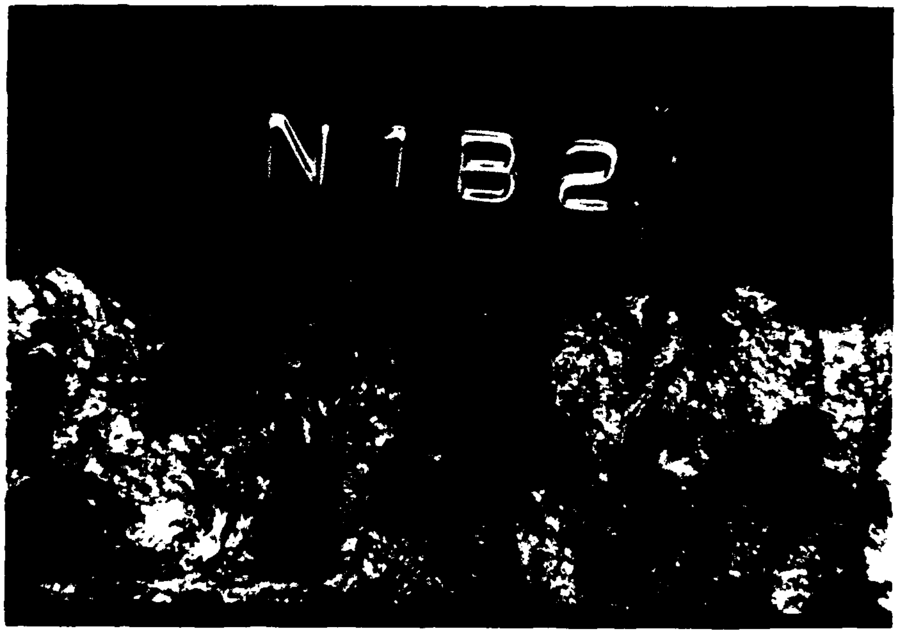
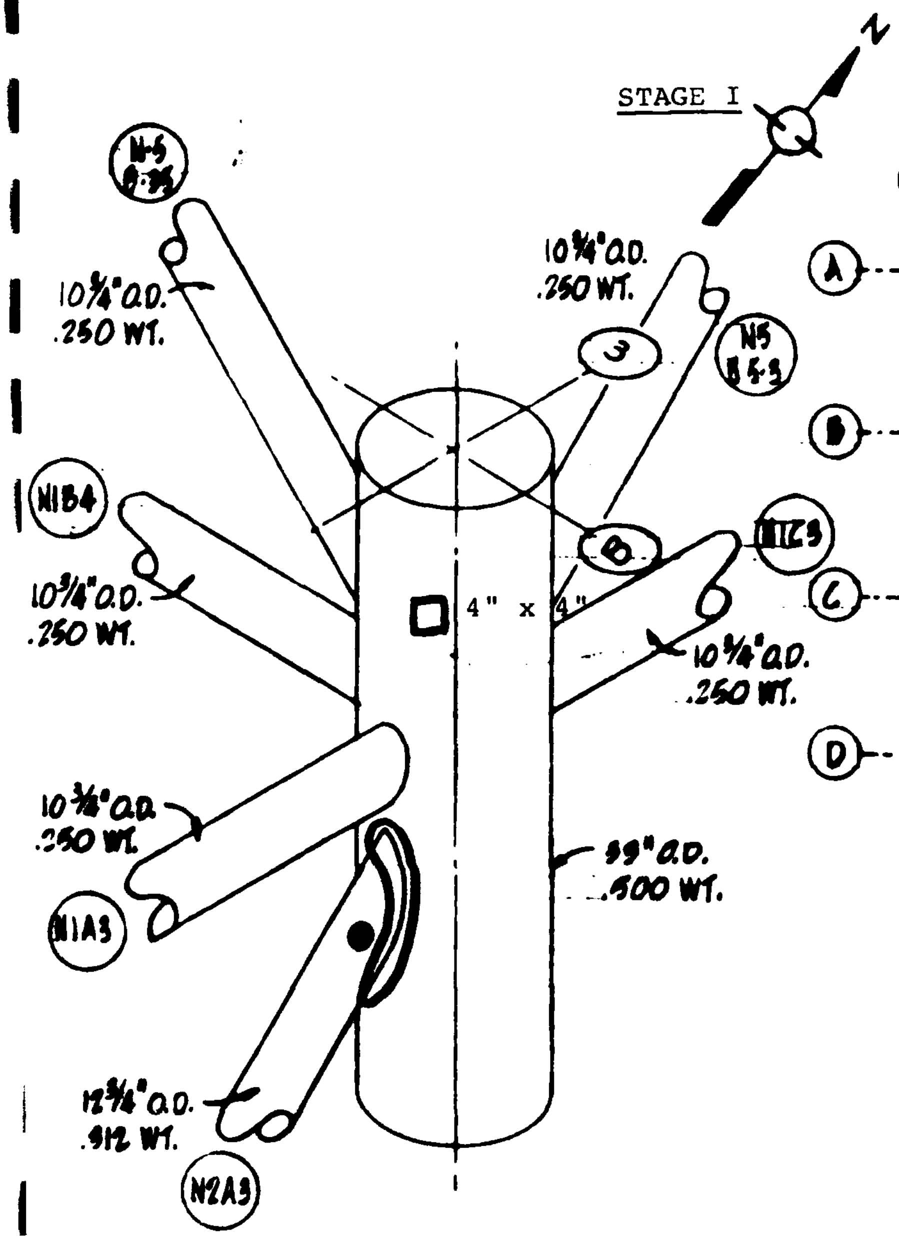
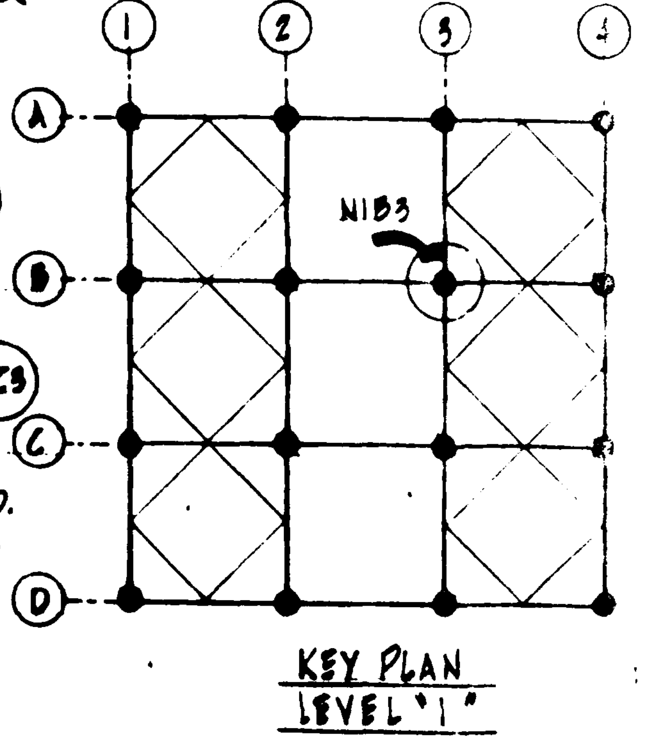


Fig. 2.1.18

The 4 by 4 inch area cleaned on leg B-2 at level 1 shows no localized base metal loss but the surface is generally deteriorated.

Fig. 2.1.19





WELD NO:	N1B3
DATE CLEANED:	12-8-80
DIVERS NAME:	S. Manlove
VISUAL INSP. DATE:	12-8-80

CP 614, 619
Bio-Fouling 1-½"

Weld at 10:00
3/8" deep pits in weld

Fig. 2.1.20

The level 1 junction of the B-3 brace down to N2A3 on the 9:00 (above) and 3:00 (below) sides. The large pits in the weld at 10:00 and 3:00 are shown in close-ups on the next page.

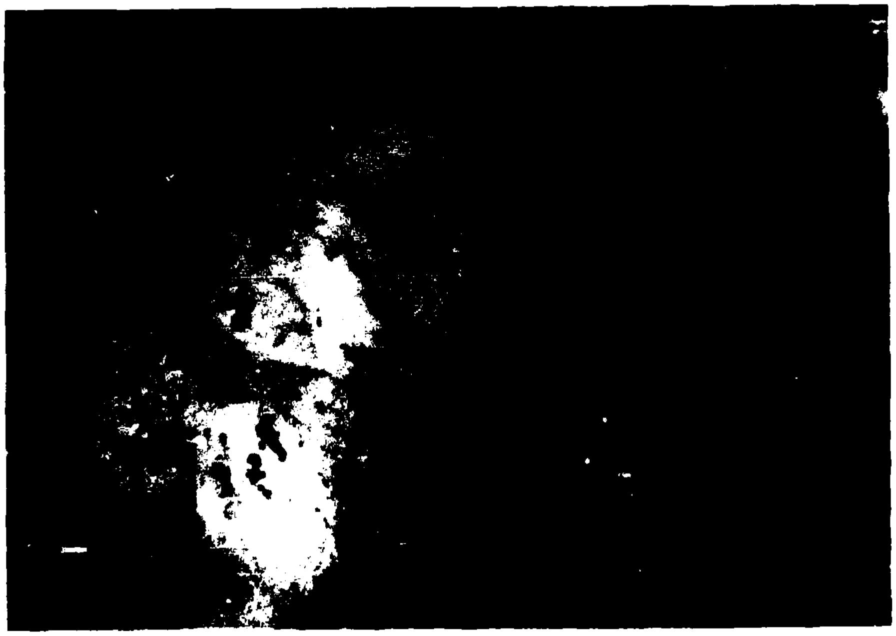


Fig. 2.1.21

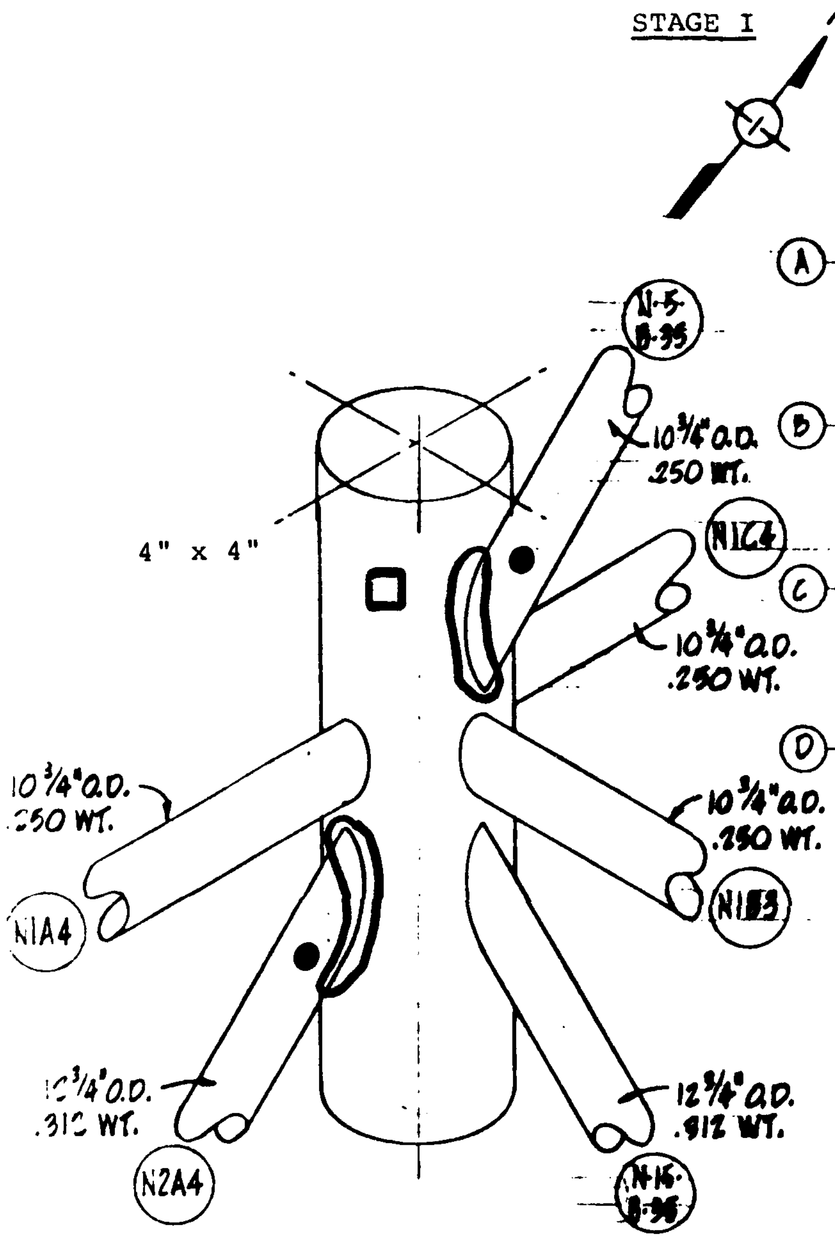
Pit in weld at 10:00 is 3/8 inch deep. Shallow pit at 3:00 (below) extends into weld from concave, undercut edge adjacent to the brace.

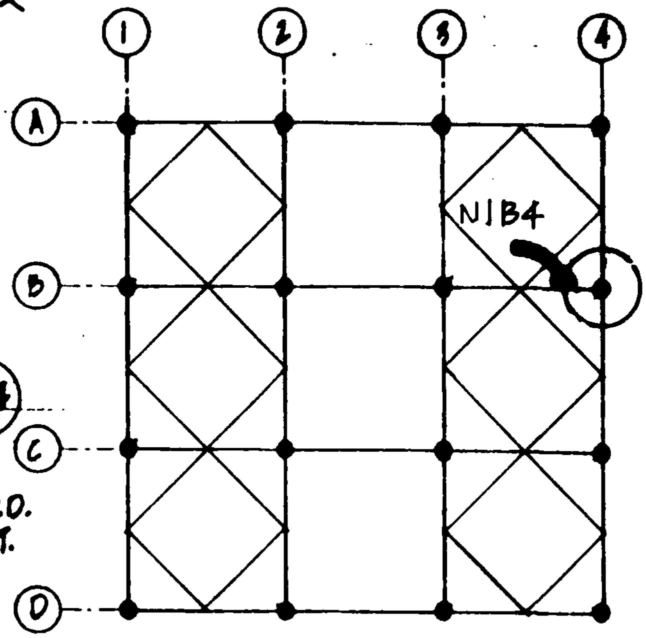
Fig. 2.1.22

The cleaned 4" x 4" area on leg B-3 shows a distinct line of shallow pitting caused by small-diameter cable or wire rope no longer present.

Fig. 2.1.23

STAGE I





KEY PLAN
LEVEL "1"

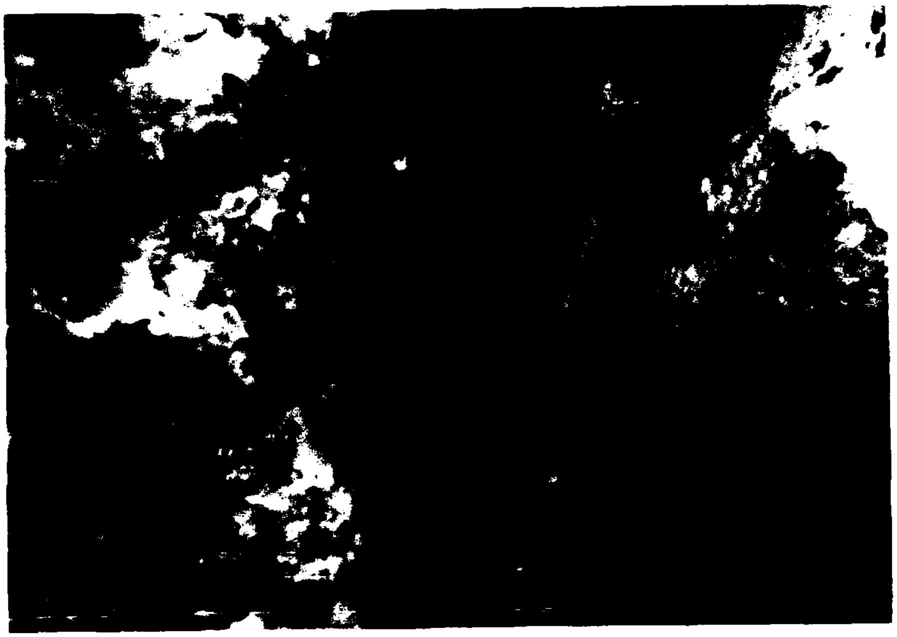
WELD No:	N1B4
DATE CLEANED:	12-8-80
DIVERS NAME:	S. Manlove
VISUAL INSP. DATE:	12-8-80

CP 632, 633
Bio-Fouling 1"

Weld at 9:00 to N-5B35
100% light pitting

Weld at 9:00 to N2A4
100% light pitting

Fig. 2.1.24



The B-4 junction at level 1 of the brace up to N5B35, at 9:00 (above) and on the lower 3:00 side (below). On the 9:00 side, note undercutting on the leg side of the weld and small pitting along the brace side in the heat-affected zone.

Fig. 2.1.25

Close-ups of the same junction shown on the previous page. Above is weld at 10:00 and portion below is at about 4:00.

Fig. 2.1.26

Also at leg B-4, the junction of the brace down to N2A4 at 9:00 (above) and 3:00 (below). In lower photo, undercutting and pitting are obvious on the side of the weld adjacent to the leg.

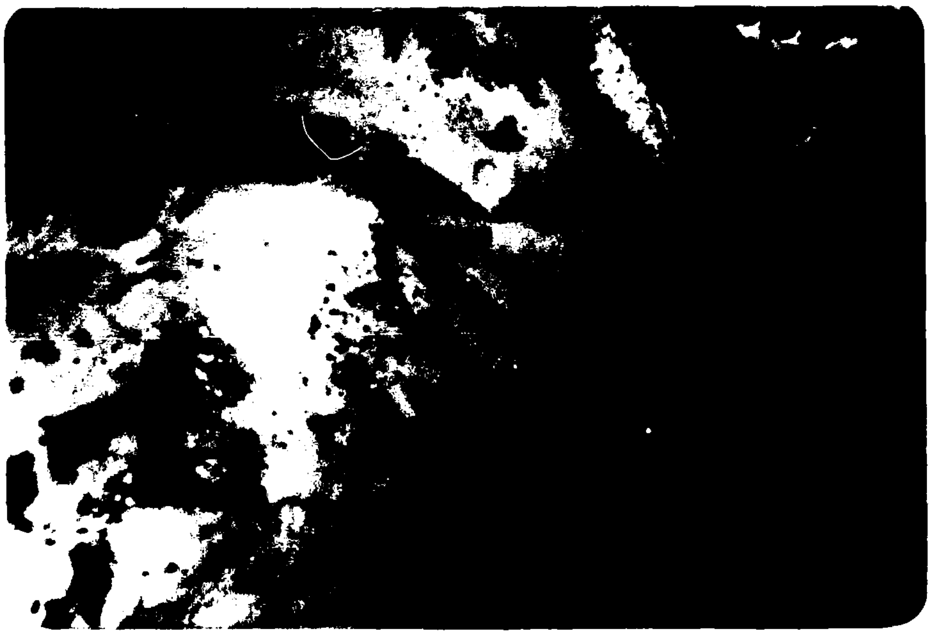


Fig. 2.1.27

Shallow base metal loss covers the 4" x 4" area cleaned on Leg B-4.

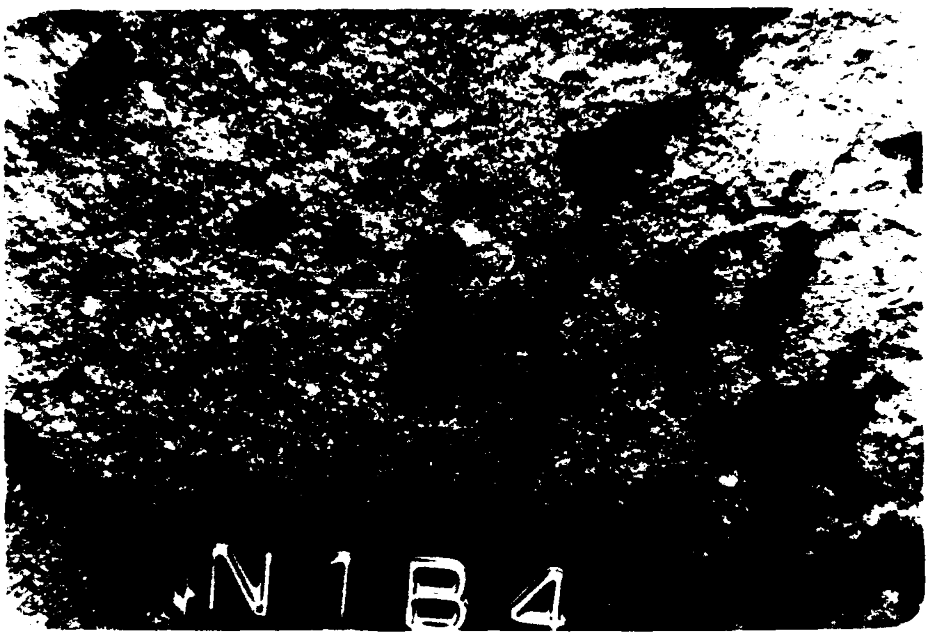
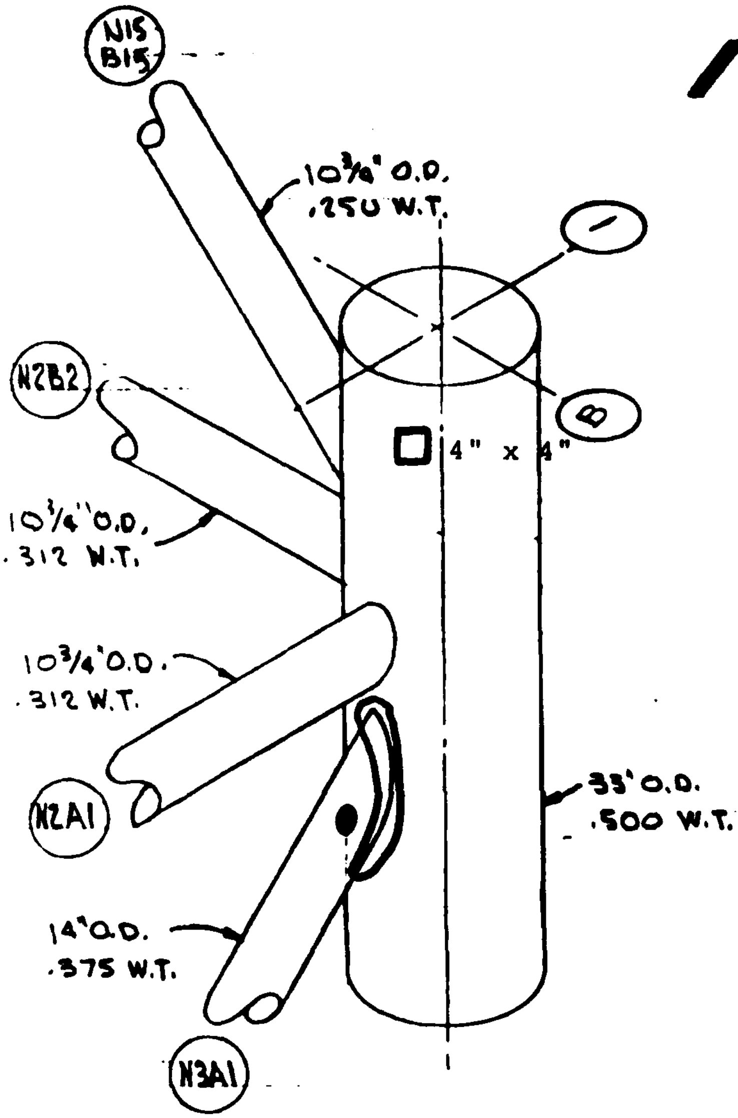
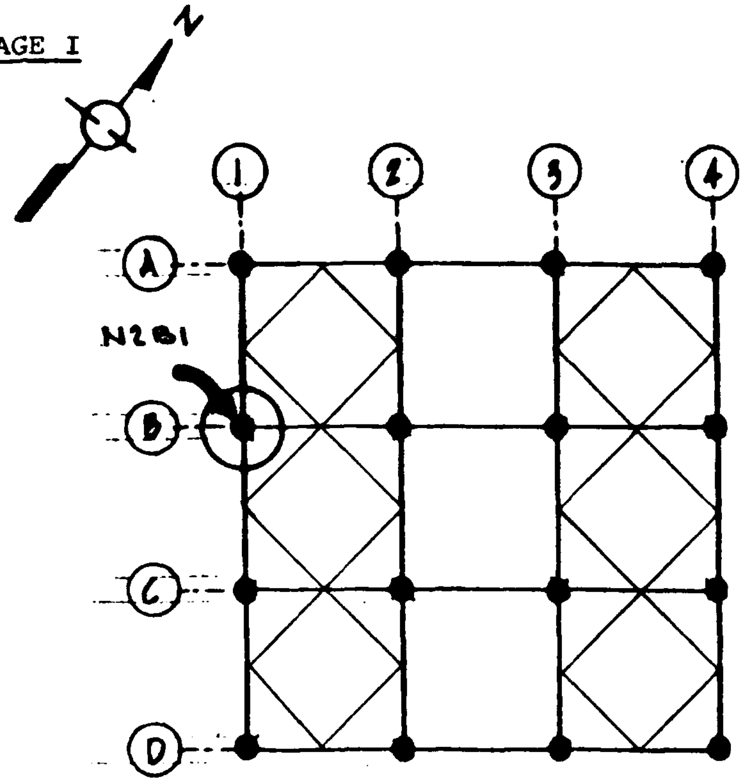


Fig. 2.1.28

STAGE I





KEY PLAN
LEVEL "2"

WELD No:	N2B1
DATE CLEANED:	12/5/80
DIVERS NAME:	G. Frost
VISUAL INSP. DATE:	12/5/80

CP 654, 667
Bio-Fouling 1-½"

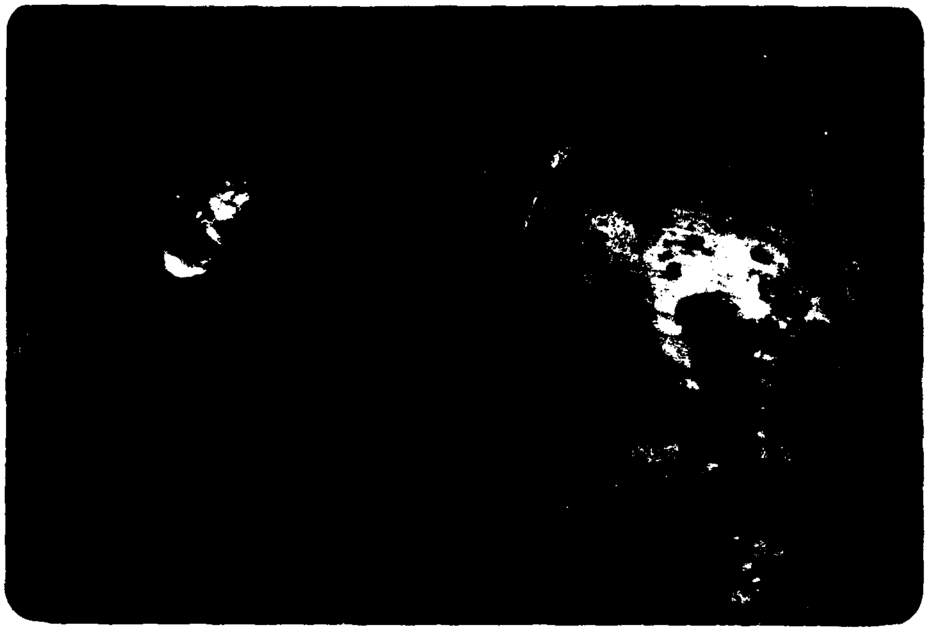
Weld & Diag. at 3:00
¼" deep pit on brace
3/16" deep pit in weld

Weld at 3:00
¼" deep pit on brace
¼" deep pit in weld
Pit in node ¼" deep, 1" long,
½" wide

Weld at 9:00
Some large pits
1/8" to 3/16" deep pits on node
3/16" deep pits on weld
3/16" deep pits on brace

4" x 4" sq.
1/8" deep pit, ½" wide,
3/4" long

Fig. 2.1.29

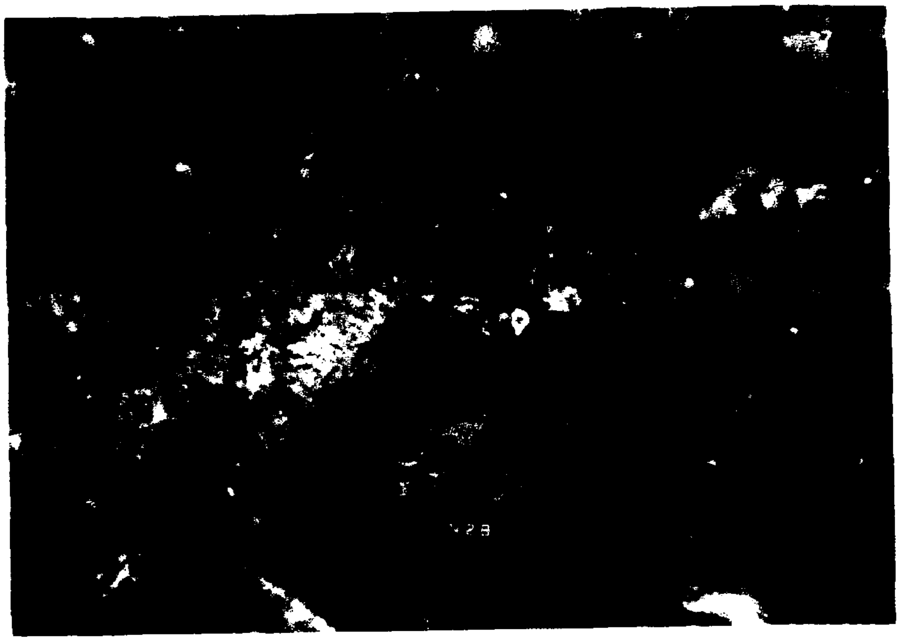


Wide-angle views of the 9:00 side (above) and the upper 3:00 side (below) of the N2B1 vertical diagonal down to N3A1, the location shown on previous page. The base metal has large pits in it 1/8 to 3/16 inch deep.

Fig. 2.1.30

Photo below is close up of pit shown above on the brace opposite the location tag at 3:00. It is 1/4 inch deep. The weld pit is 3/16 inch deep.

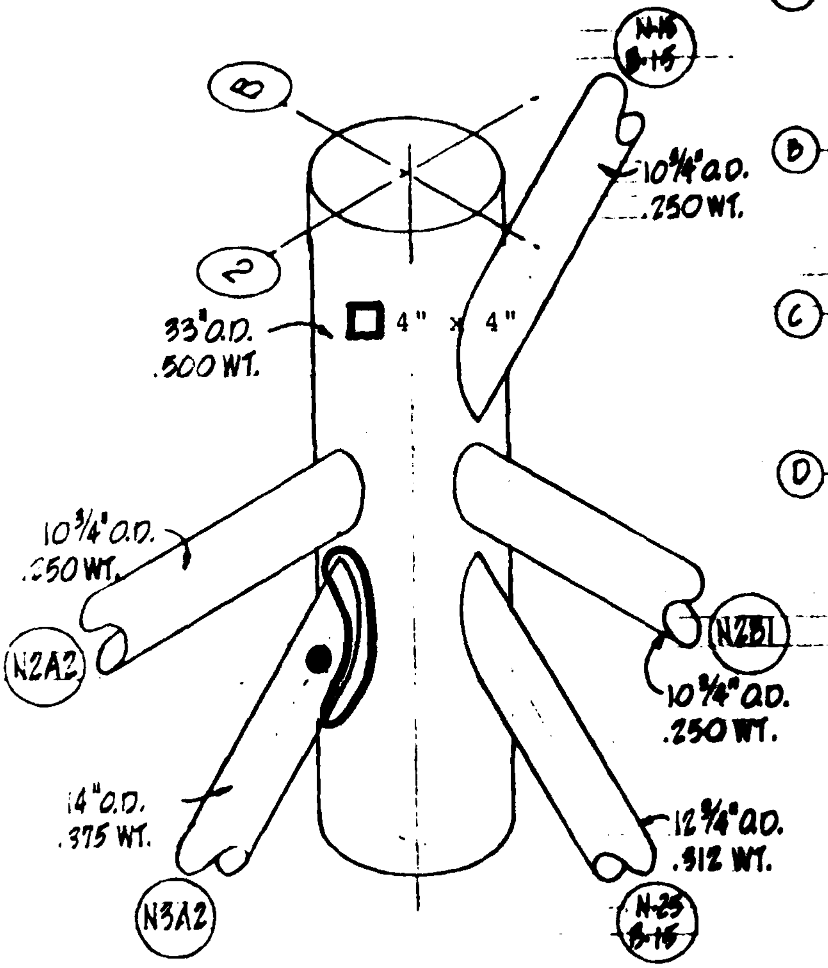
Fig. 2.1.31

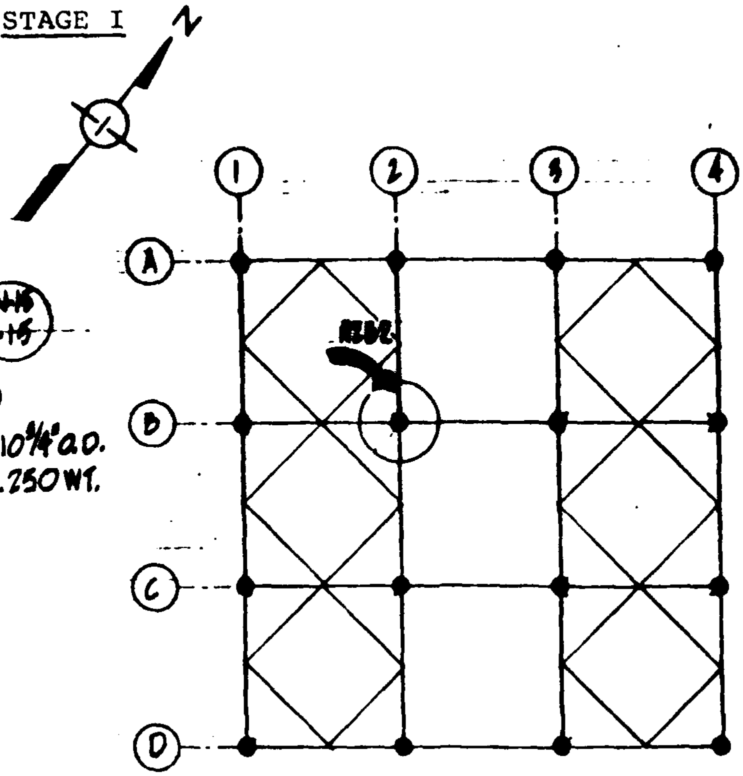


Two views of cleaned 4" x 4" area on leg B-1. The larger of the pits is 3/4 inch long, 1/2 inch wide and 1/8 inch deep.

Fig. 2.1.32

STAGE I





KEY PLAN
LEVEL "2"

WELD Nº:	N2B2
DATE CLEANED:	12/5/80
DIVERS NAME:	G. Frost
VISUAL INSP. DATE:	12/5/80

CP 655
Bio-Fouling 2-3/8"

Pitting in diag. at 9:00
1/8" deep 3/4" long

4" x 4" sq.
Numerous pits in jacket leg

Fig. 2.1.33

The 3:00 (above) and 9:00 (below) sides of the junction illustrated in the sketch on the previous page. Although some bead texture is obvious on the weld in spite of the oxidation product clinging to it, the surface is generally pitted. Large, shallow pitting is obvious in the brace.

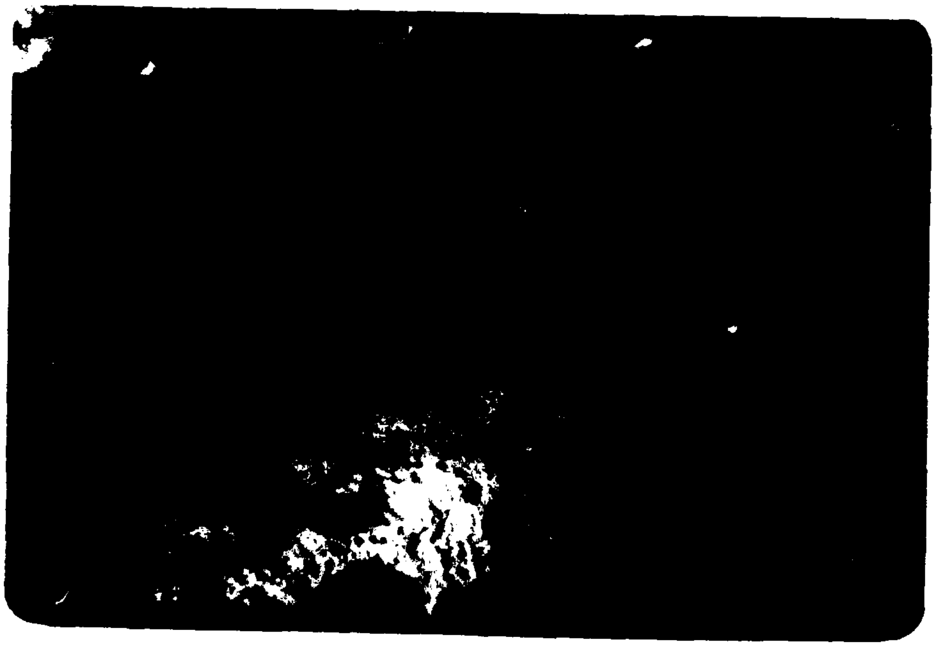
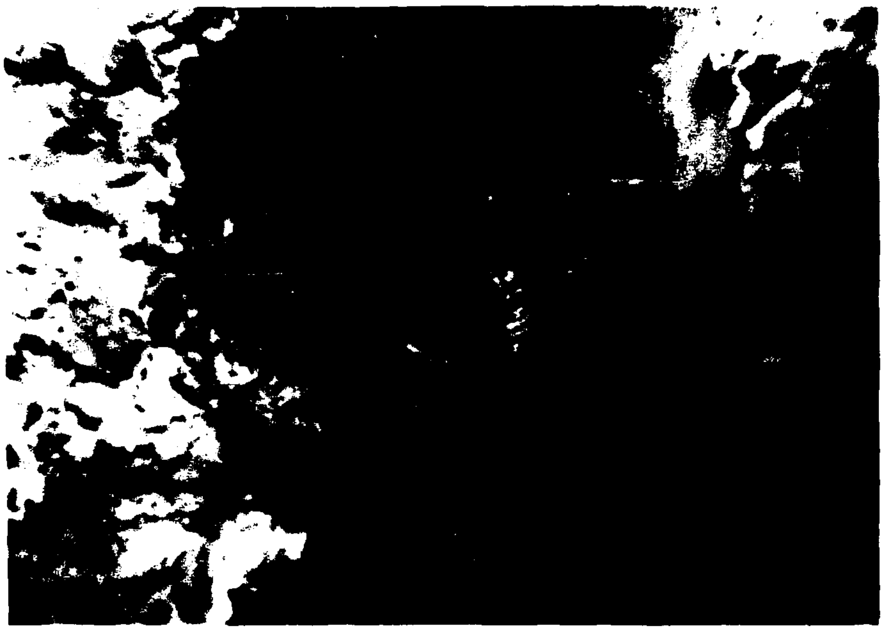


Fig.2.1.34

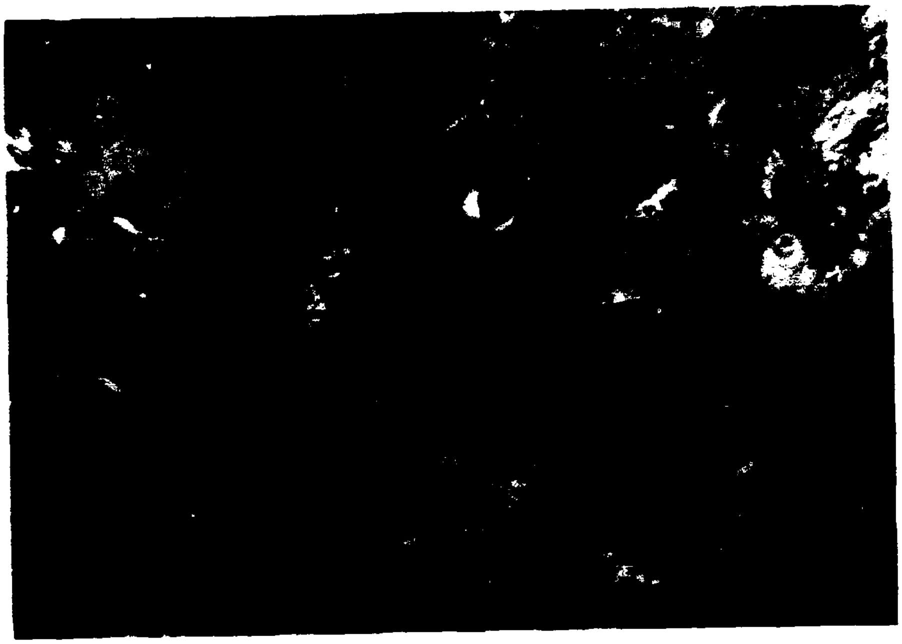


Same junction at about 7:00 is shown above. Close-up below is of same pit visible in lower left side of lower photo on previous page. It is 3/4 inch long, 1/2 inch wide and 1/8 inch deep.

Fig. 2.1.35

Close-ups of deteriorated weld on junction N2B2. Pit in upper photo is also shown in wide-angle view of 3:00 side at lower edge of photo on previous page. Photo below shows extreme crevice corrosion on lower side of weld possibly initiated by under-cutting during fabrication.

Fig. 2.1.36



Wide-angle (above) and close-up (below) views of the 4- by 4-inch area cleaned on leg B-2 showing numerous pits in jacket leg.

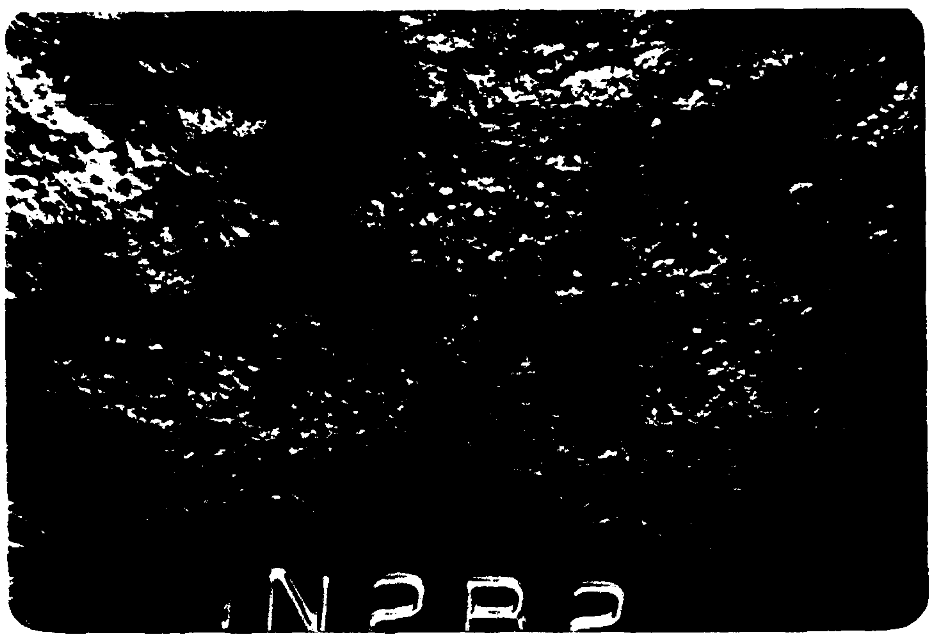
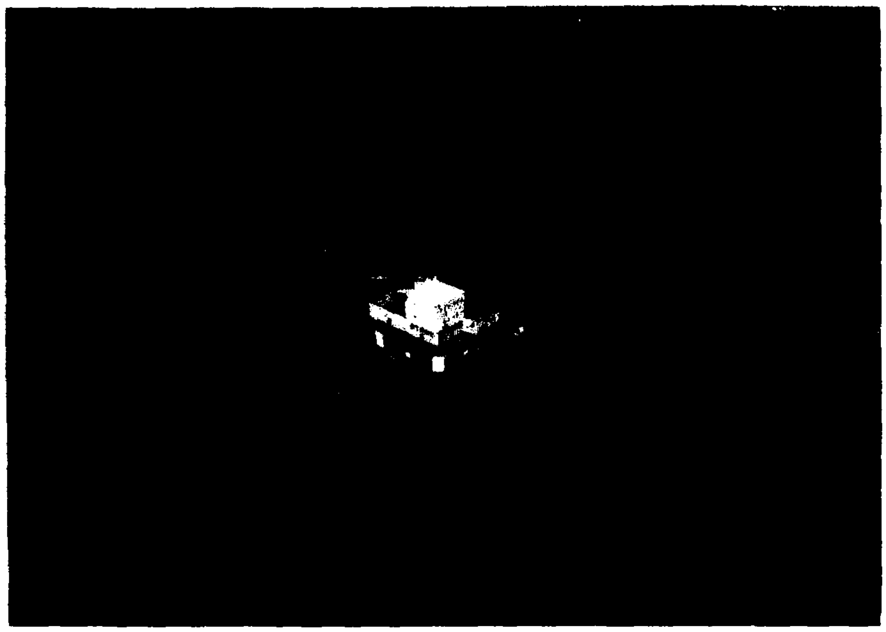
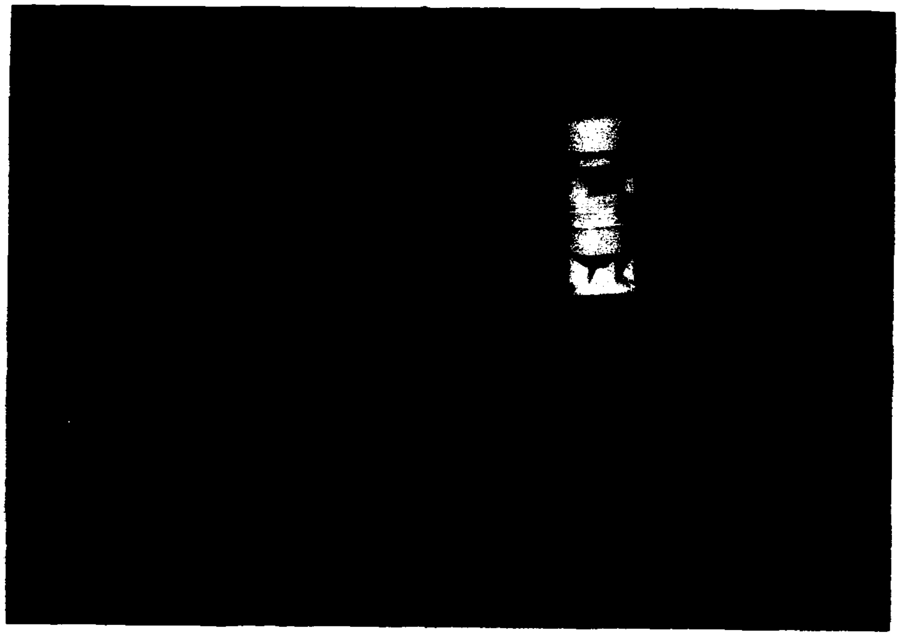


Fig. 2.1.37



Stage II, a 9 pile platform in 60 ft. of water is shown above. Below is leg A-1 at +10 feet. Note localized areas of corrosion on the weld of the cleat, on the weld joining the deck section to the jacket, and on base metal.

Fig. 2.2.0



Two views of flight deck showing rust in areas
no longer protected by paint, approximately
20 percent of the deck surface.

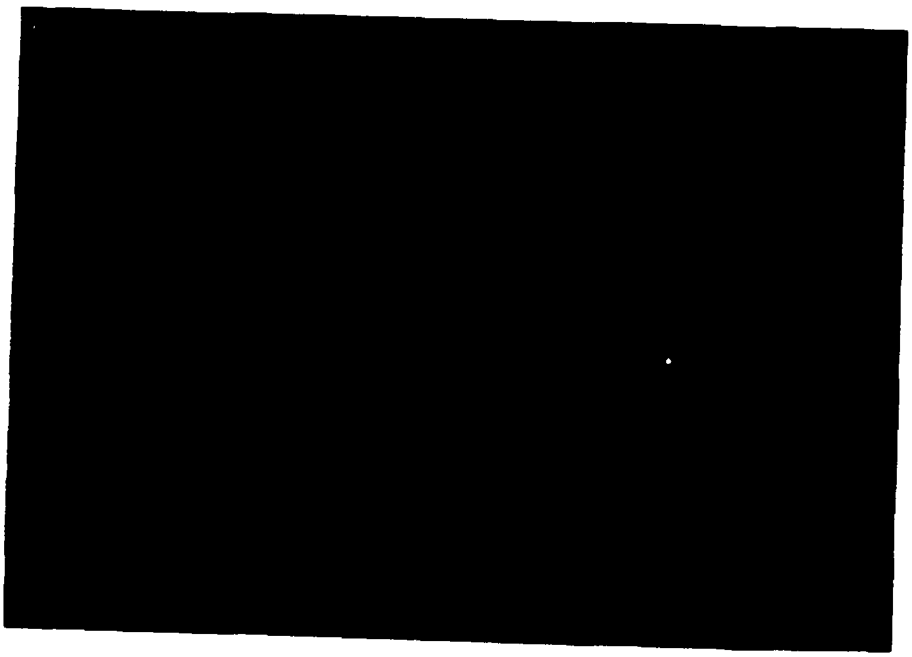


Fig. 2.2.1

Views of upper deck with severe corrosion on 90 percent of the surface.

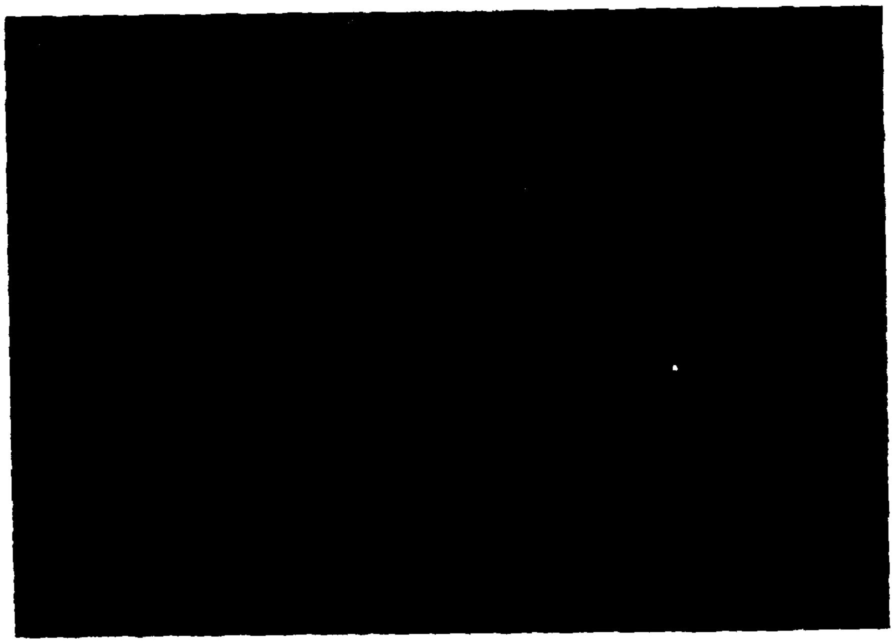


Fig. 2.2.2

Additional documentation of corrosion on upper deck. Heads of bolts have corroded away leaving holes along the edge of the hatch plate.

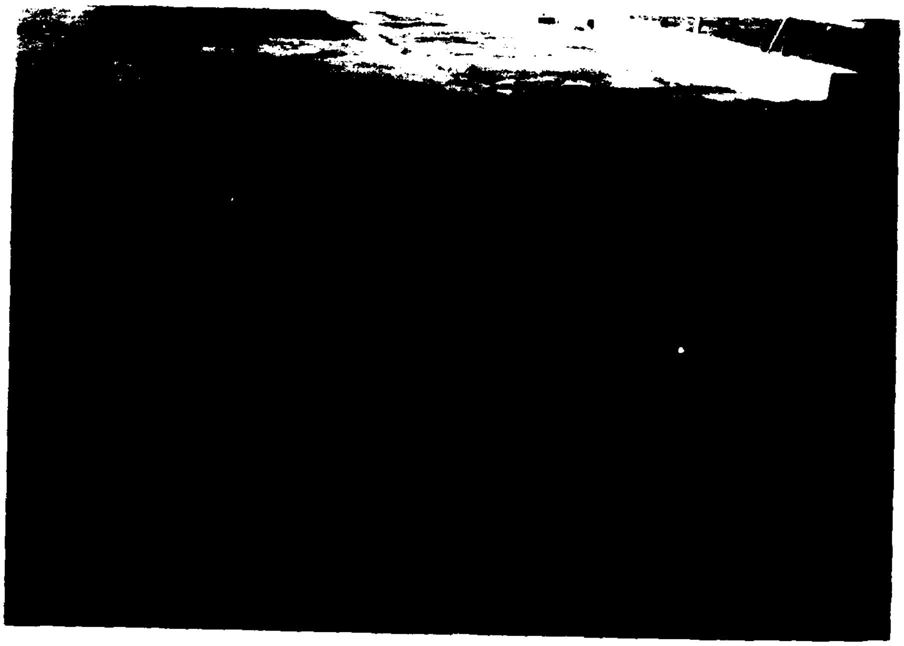


Fig. 2.2.3

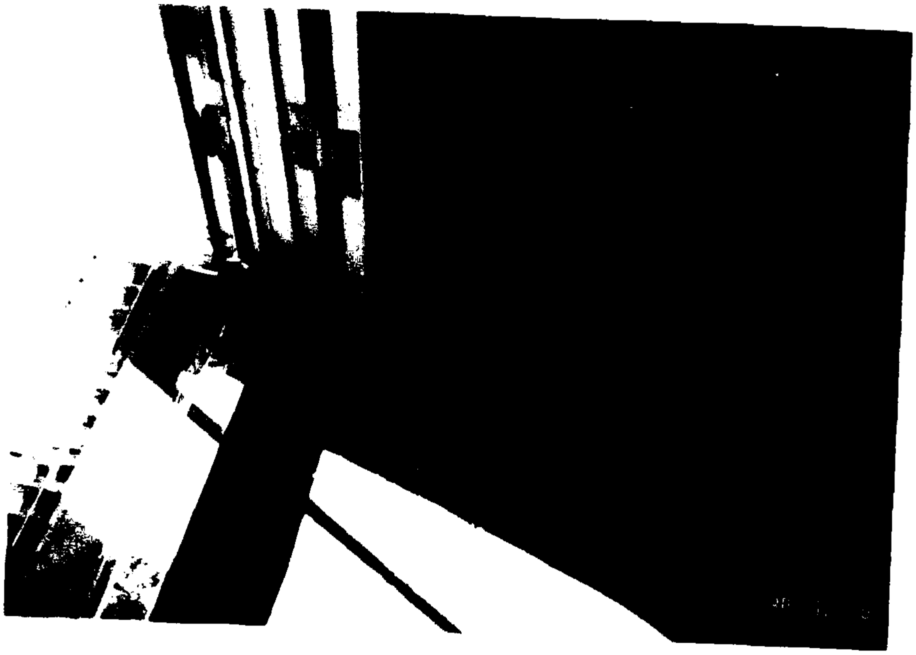


Photo above shows corrosion holes in the main deck plating near and at the entrance to the catwalk. Below is shown locally severe pitting on the plating in the repair shop.

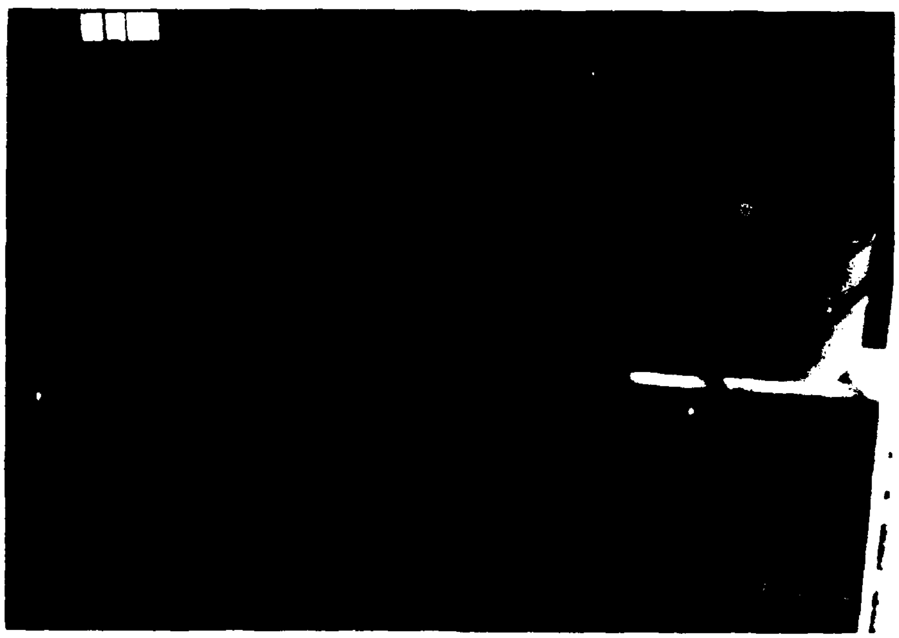
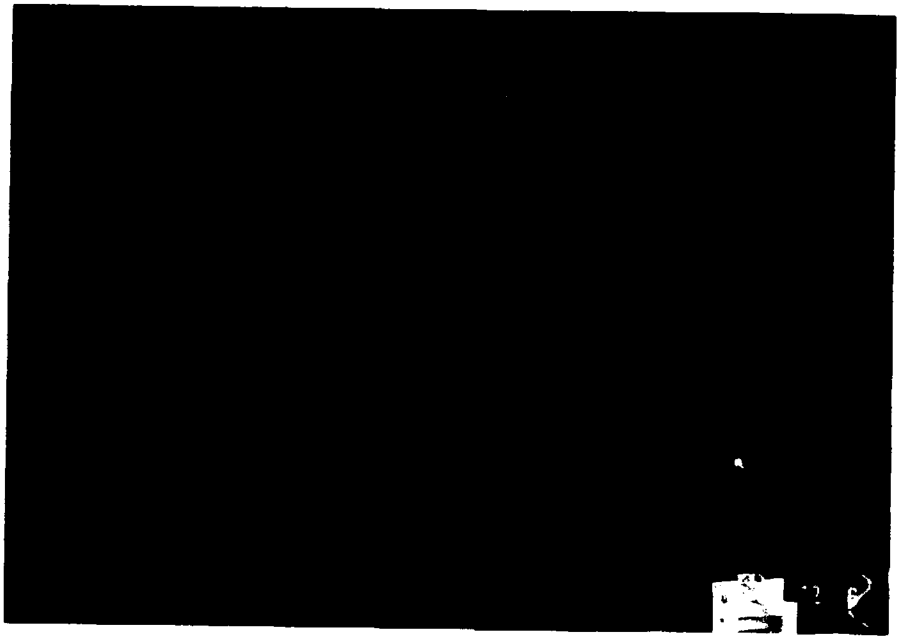


Fig. 2.2.4



Two views of the underside of the main deck showing corrosion effects. Note hole in lower photo and accentuated corrosion on the thin-walled piping.

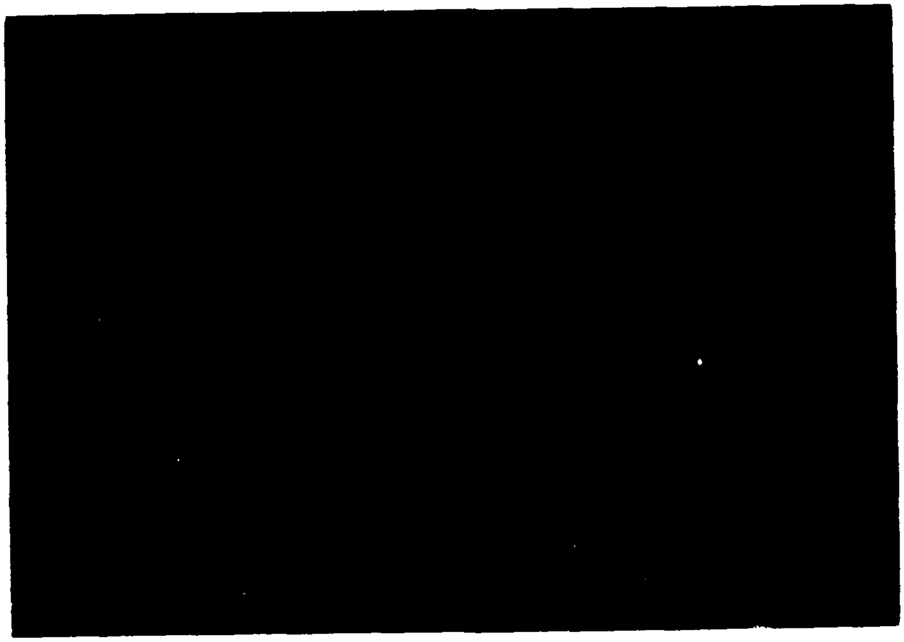
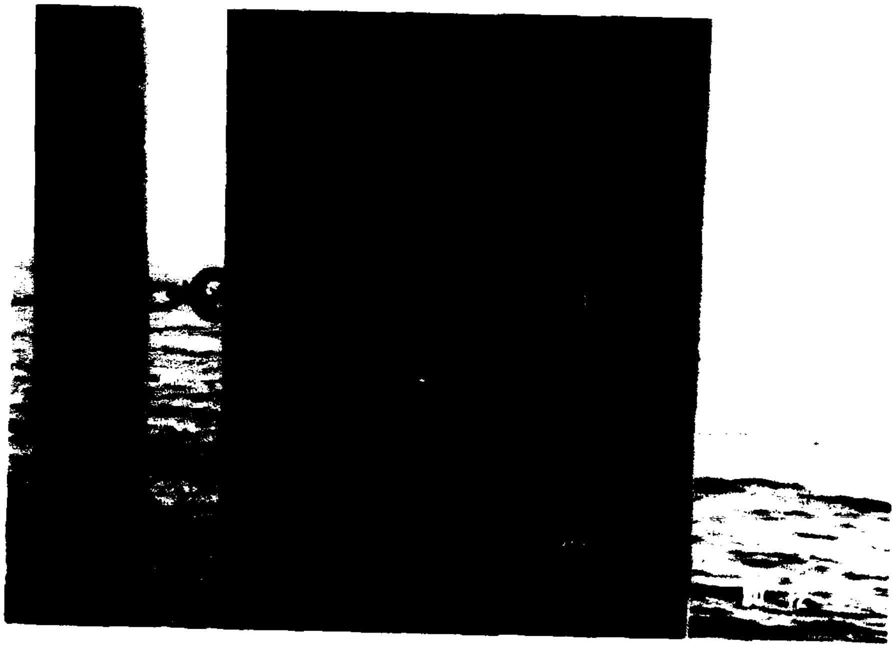


Fig. 2.2.5

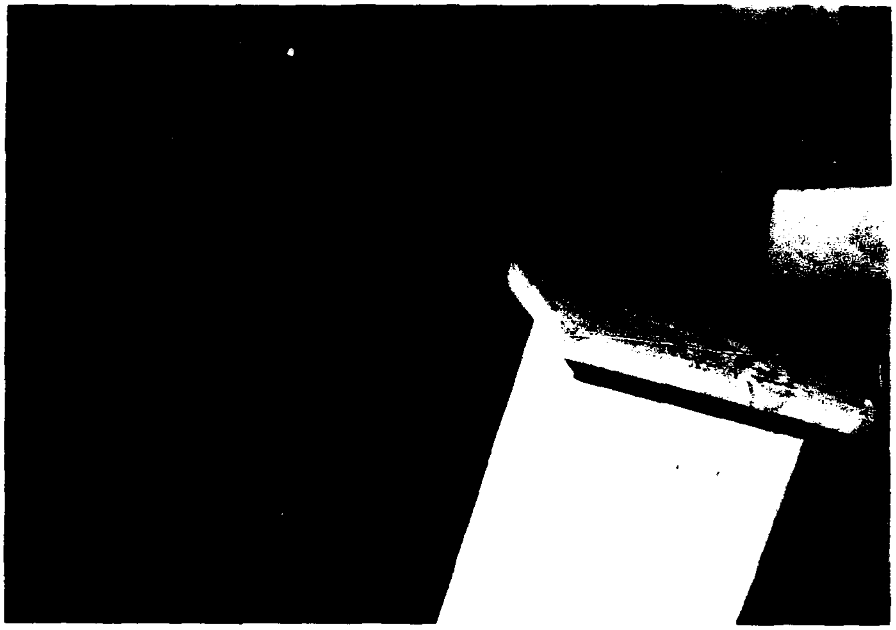
Rust under paint blisters close to +10 feet level at leg A-2 (above) and at A-3 (below).

Fig. 2.2.6



Severe rusting and pitting between + 16 and +20 feet on B-1 (above). Similar but more widespread corrosion evidence on the jacket and in the weld to the deck section at leg B-2 (below).

Fig. 2.2.7



Above is an additional view of the corrosion on leg B-2. Corrosion under the paint causes the obvious blisters. Below is generally severe corrosion on leg B-3.

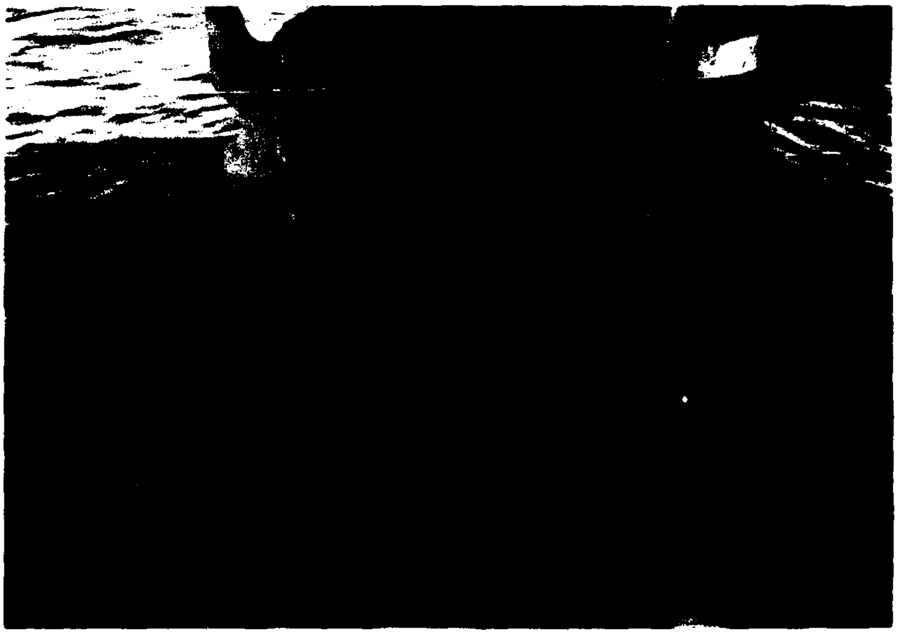
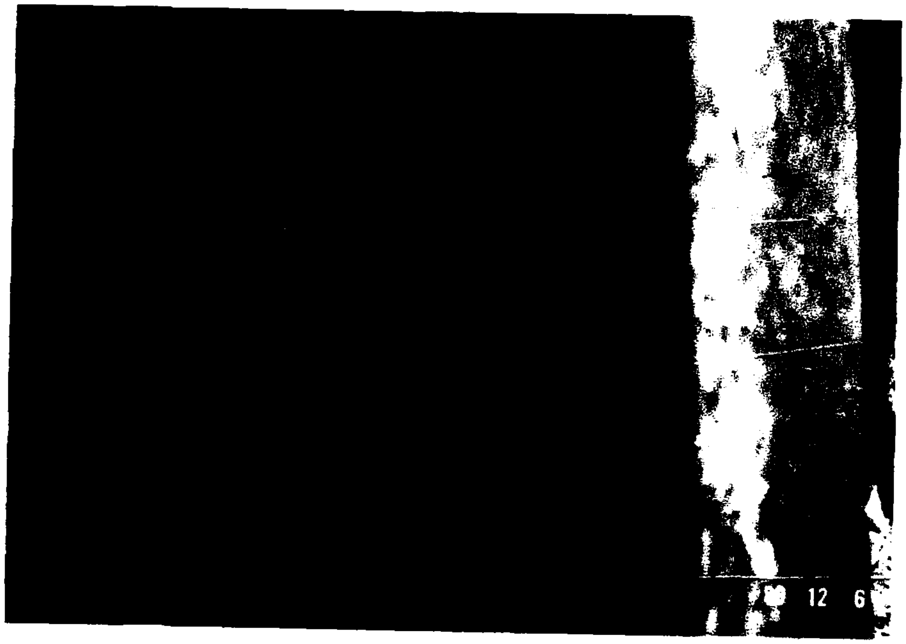


Fig. 2.2.8



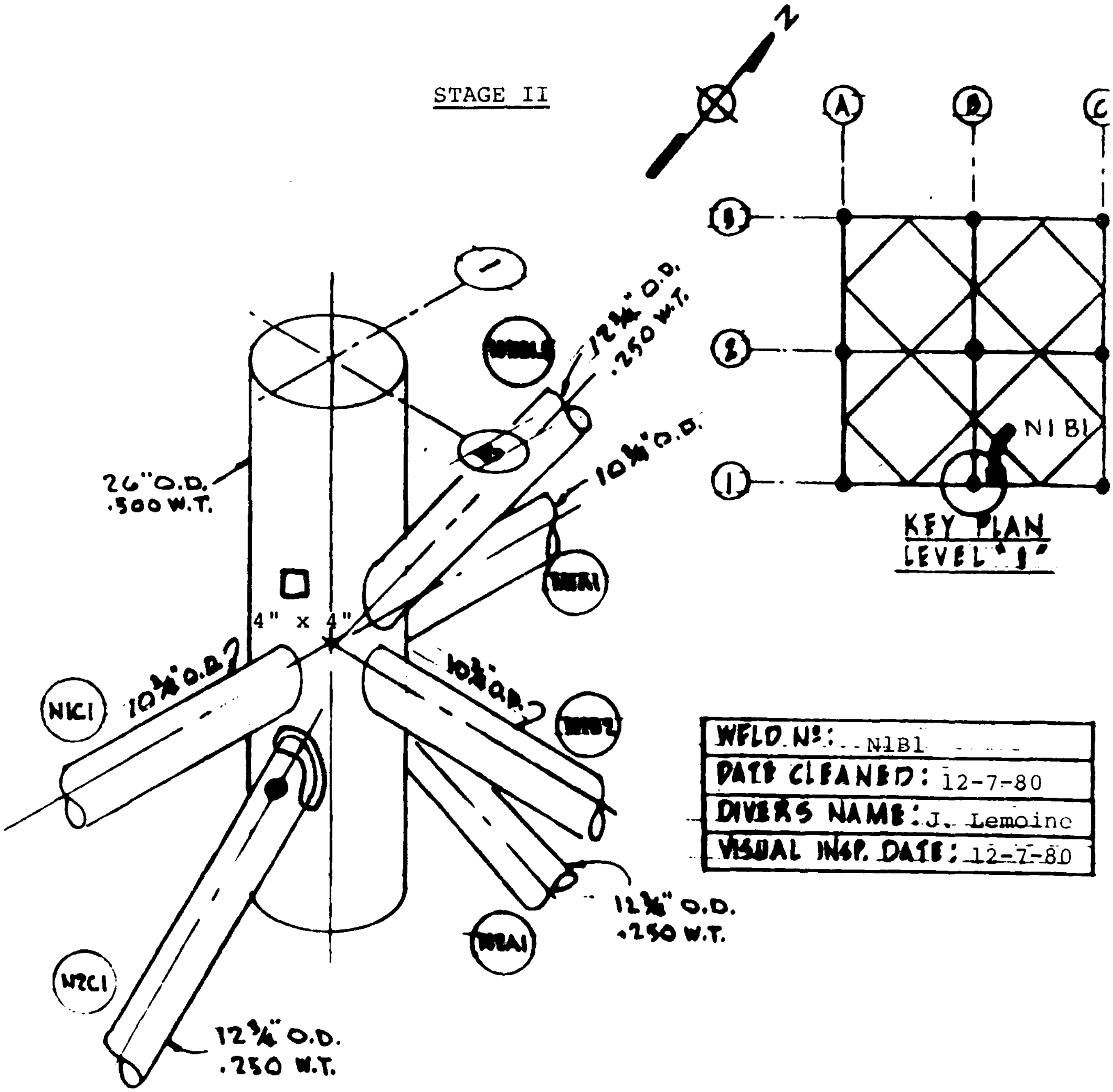
Above is locally heavy corrosion on leg C-1. Note blistering in profile and what appears to be severe thinning of plate welded to the leg (right side of photo). Below is severe corrosion including deep pitting on leg C-2.

Fig. 2.2.9

The leg C-3, localized area of rust and paint blistering (above). The severe corrosion on the boat bumper shown below is reported to be typical of bumper conditions. Note peeling edges of the steel plate.

Fig. 2.2.10

STAGE II



NOTE: At 9:00 - Large pits in weld down to root pass 3/4" in dia.

Diver was unable to detect any of the holes noted prior to water blasting, due to marine growth.

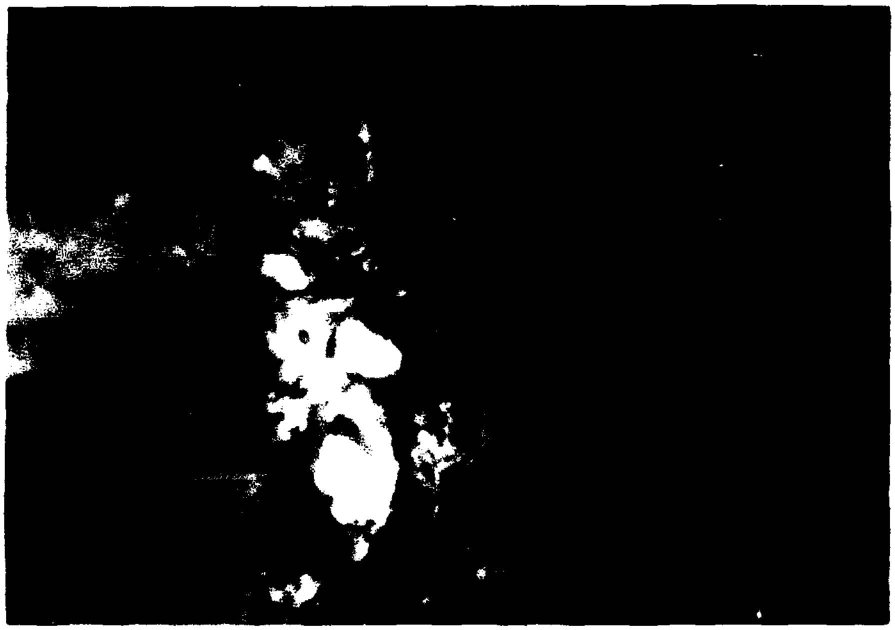
CP 653, 656
Bio-Fouling ½"

Weld at 7:00 - Pits in weld cap - Holes in brace.
Weld at 10:00 - Holes in brace.
Weld at 2:00 - Holes and heavy pitting.
Weld at 5:00 - Hole in brace.

Fig 2.2.11

The level 1 junction of the B-1 vertical diagonal down to N2C1 on the 9:00 (above) and 3:00 (below) sides. Remnants of cap bead texture remain, but there are a few large pits in the weld extending well into the leg. The base metal of the leg and brace are riddled with severe pitting and the brace is holed at 10:00 and 2:00.

Fig. 2.2.12



Same junction with holes in brace at 5:00 (above) and 7:00 (below). Black-colored pit across the weld penetrates down to the root pass.

Fig. 2.2.13

Above is pit on the brace side of the weld at 9:00
and below is base metal pit in the leg at 7:30.

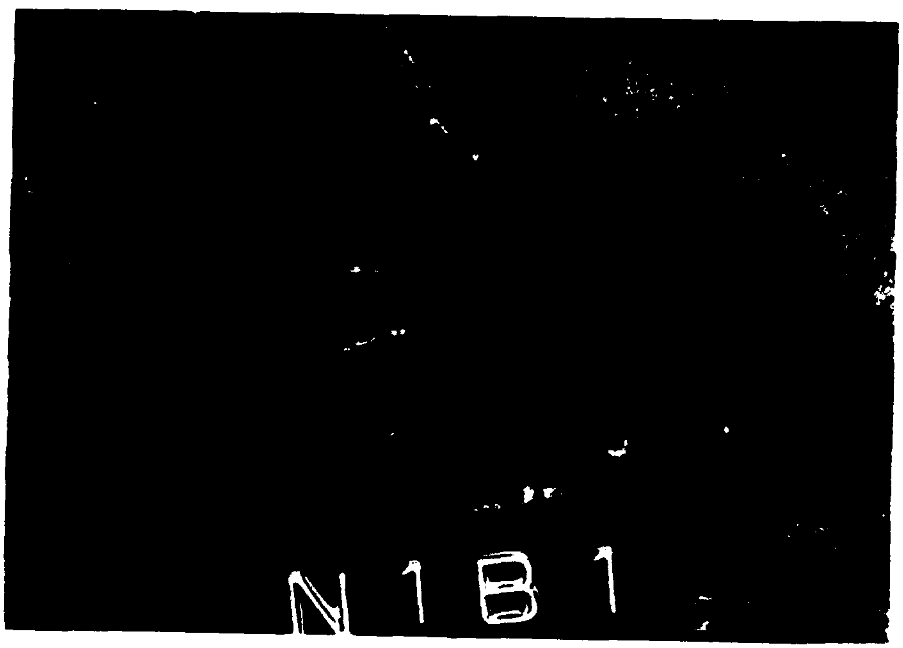
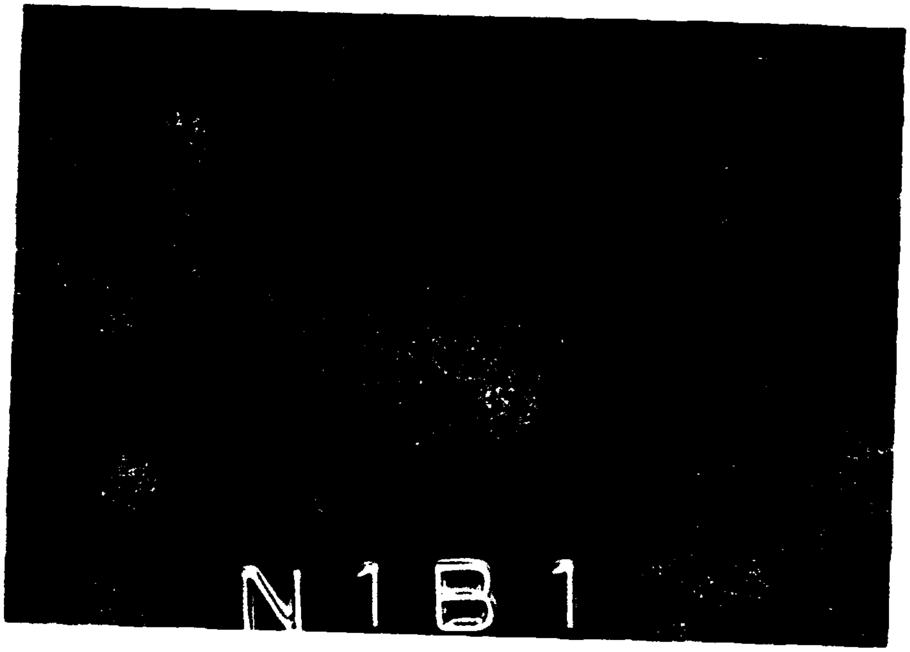
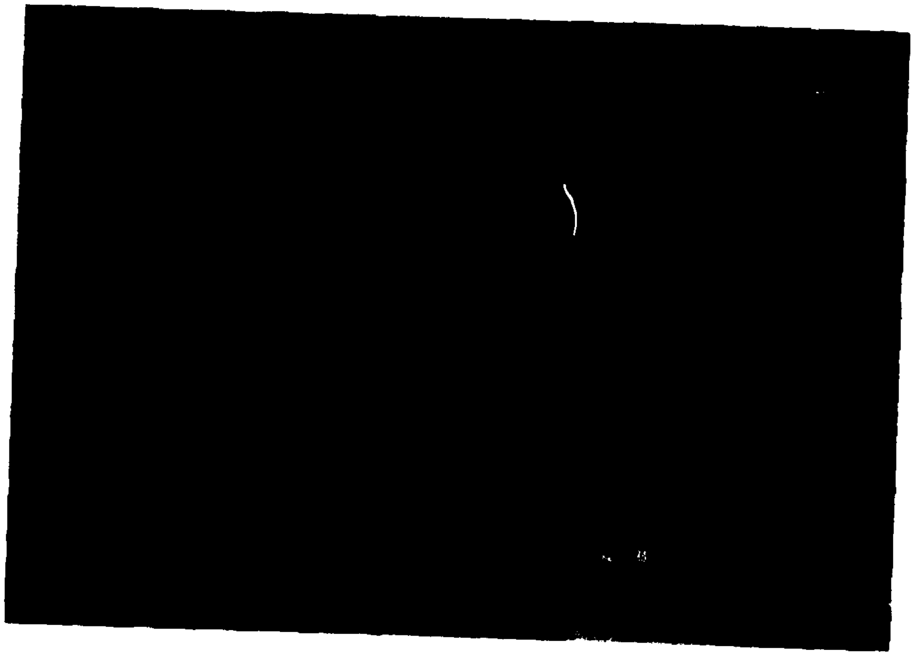


Fig. 2.2.14



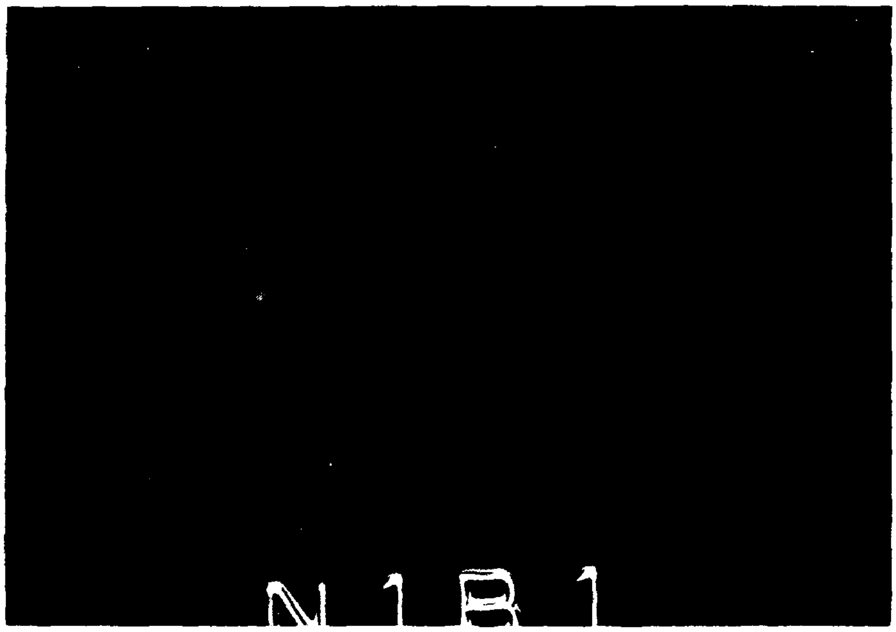
Close-ups of corrosion holes shown previously on the 9:00 side of the B-1 brace down to N2C1. The plate is obviously severely thinned by surface loss.

Fig. 2.2.15



Above is wide-angle shot of cleaned area on leg B-1. Below is additional view of the holes shown in upper photo on previous page. Also included are another small hole and general view of the metal loss in the brace.

Fig. 2.2.16



Close-ups of the deteriorated surface of leg B-1 in the large area water blasted.

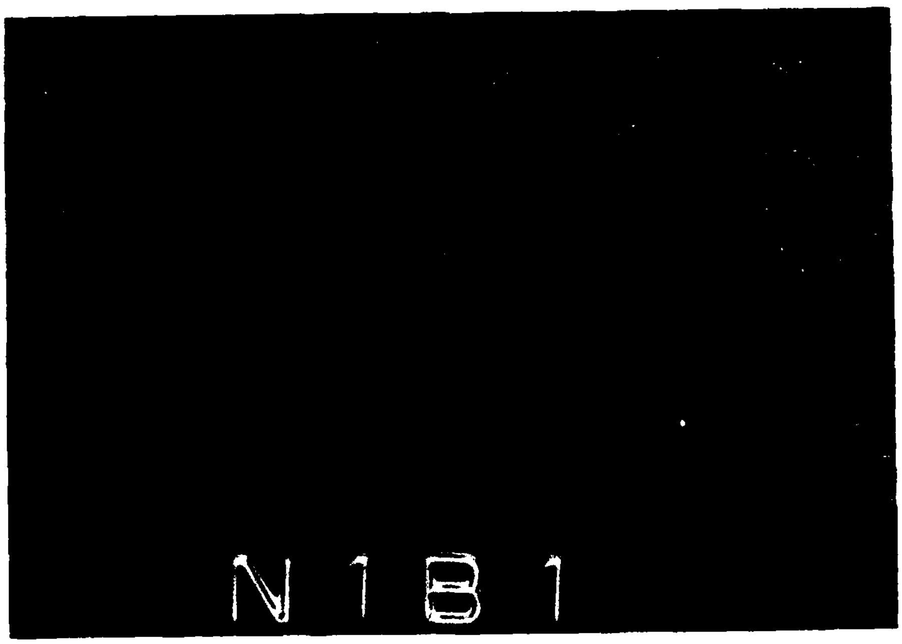
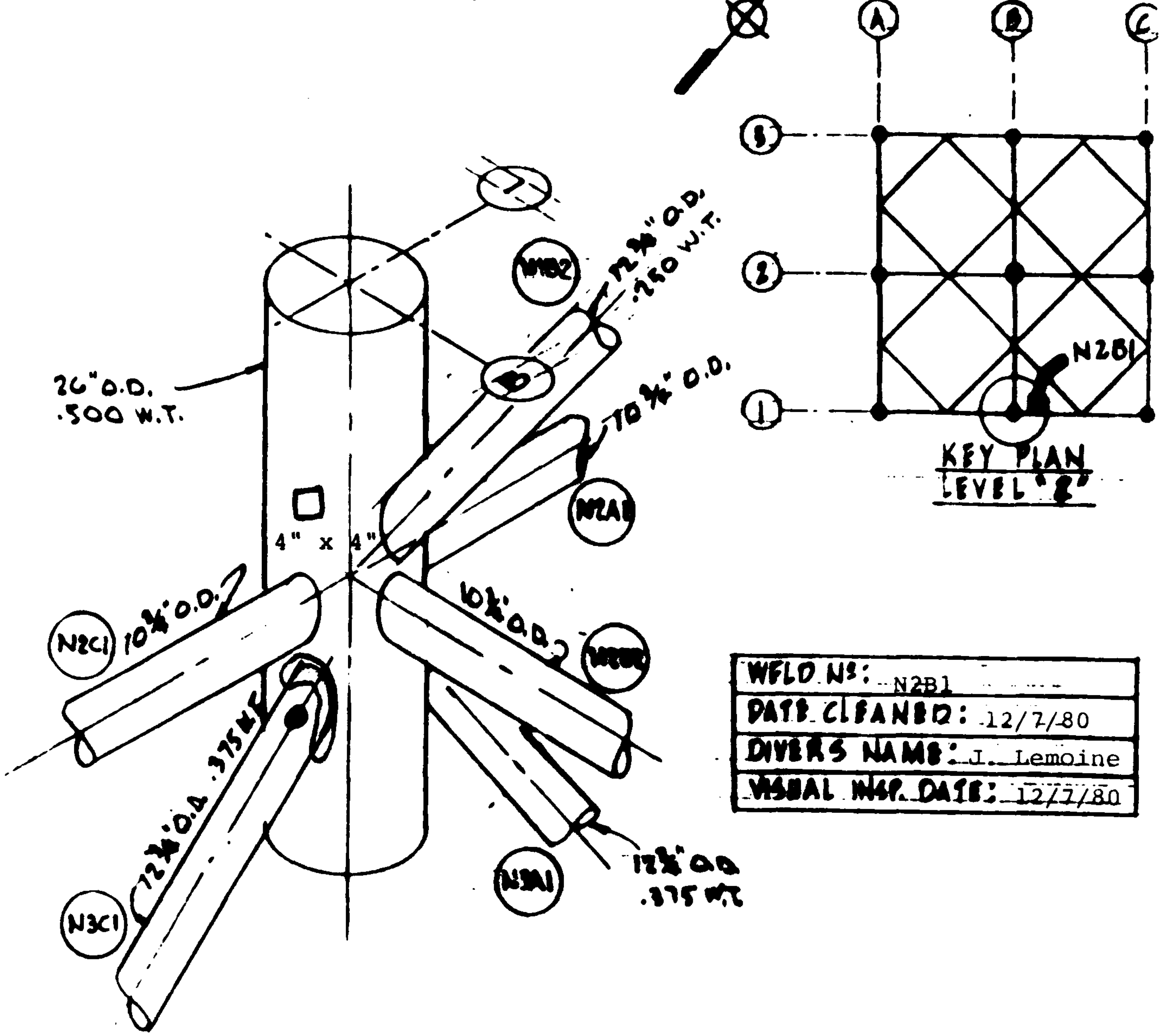


Fig. 2.2.17

STAGE II



CP 672, 697
Bio-Fouling ½"

Weld at 7:00
Heavy pitting

Fig. 2.2.18

The junction of the level 2 brace from N2B1 down to N3C1 on the 9:00 (above) and 3:00 (below) sides. Note small, deep pits in weld and, in upper portion of lower photo, the loss of cap weld. Running down the leg side of the weld is evidence of undercutting as well as corrosion.

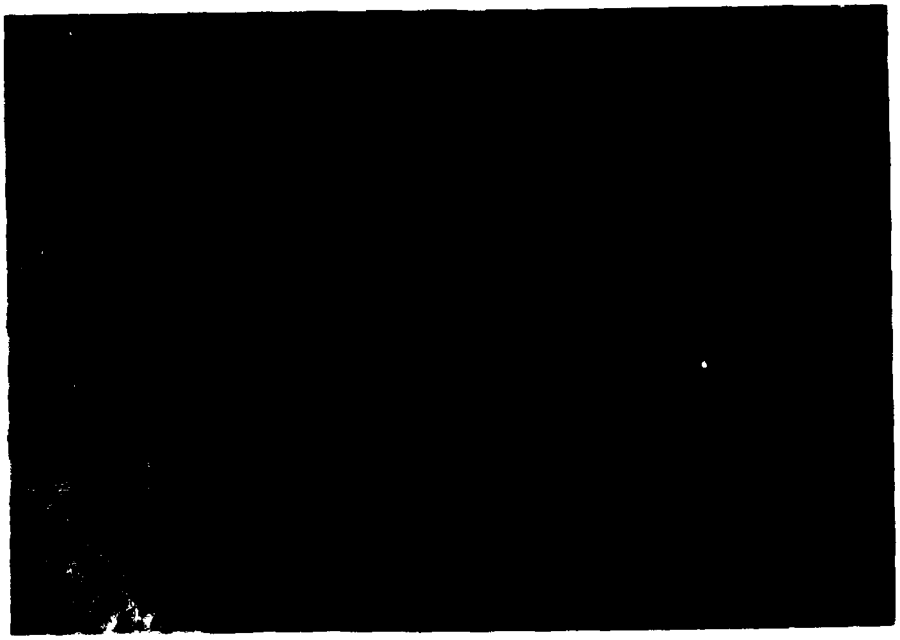


Fig. 2.2.19

Close-ups of deteriorated weld at 4:00 (above) and at 10:00 (below).

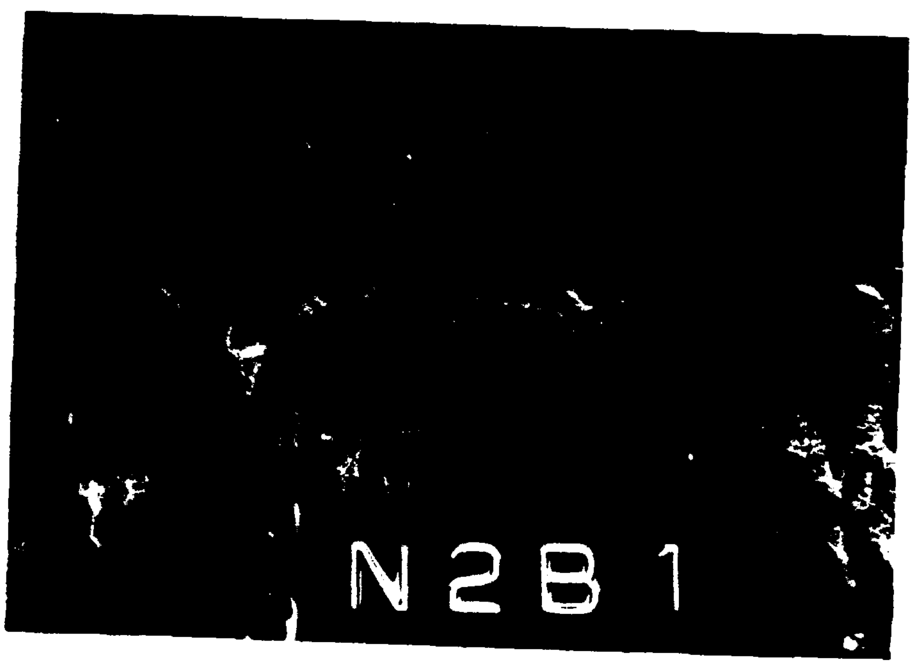
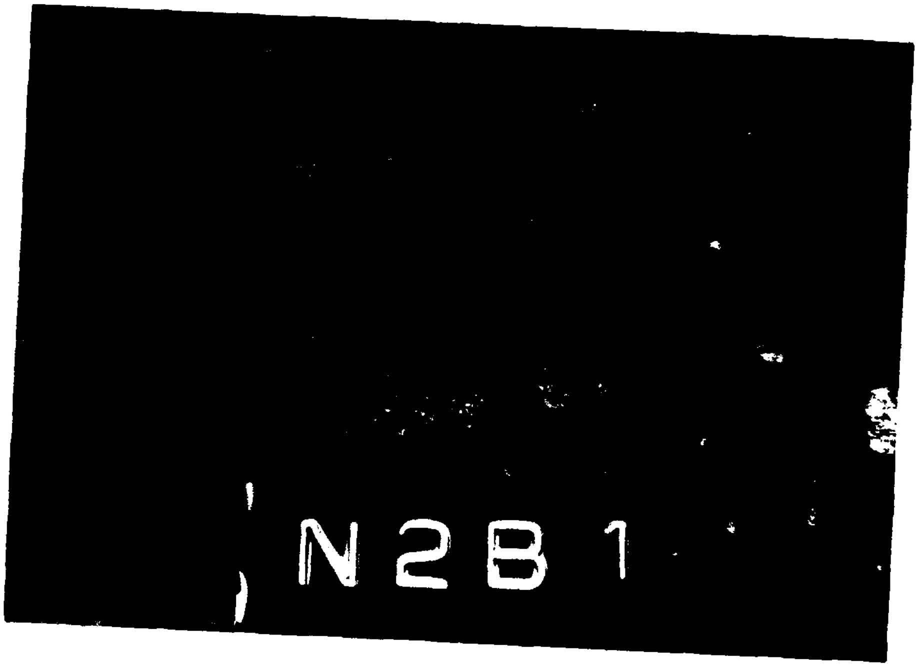


Fig. 2.2.20



Above is weld loss at 3:00 and below is base metal pit in the brace down to N3C1 and 1 foot from the leg.

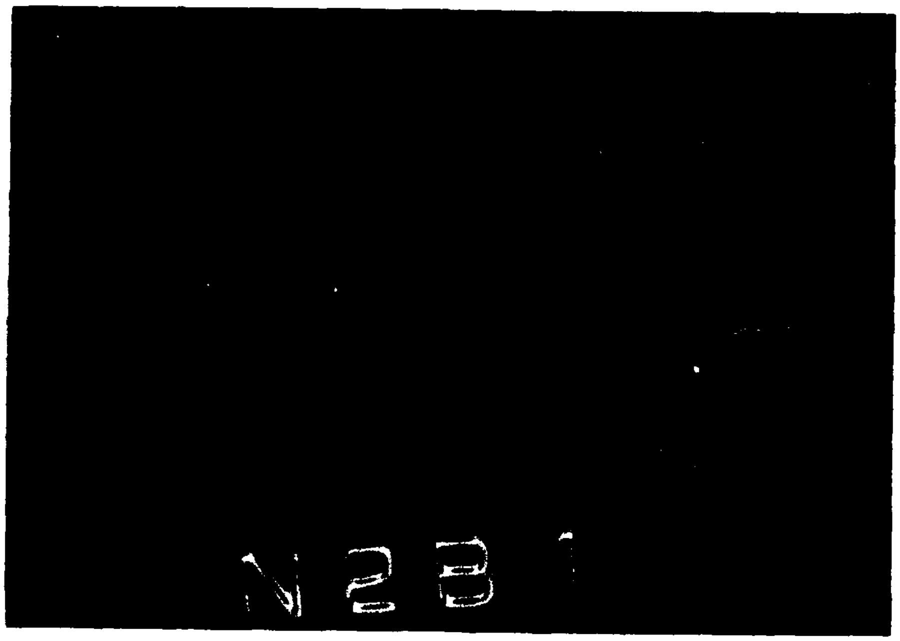


Fig. 2.2.21

Water blasted 4" x 4" area on leg B-1, level 2. Large pits shown again in close-up is 1/4 inch deep.

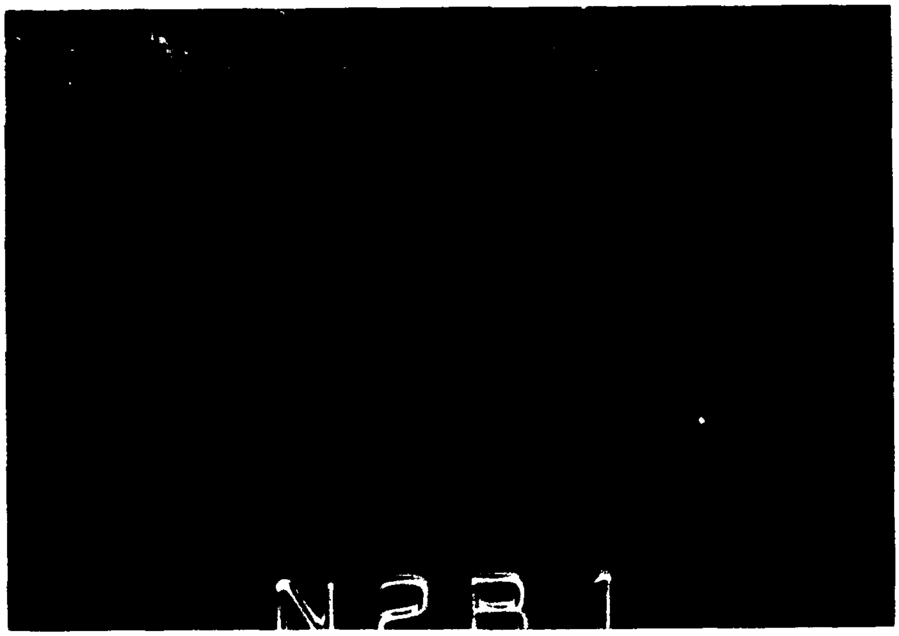
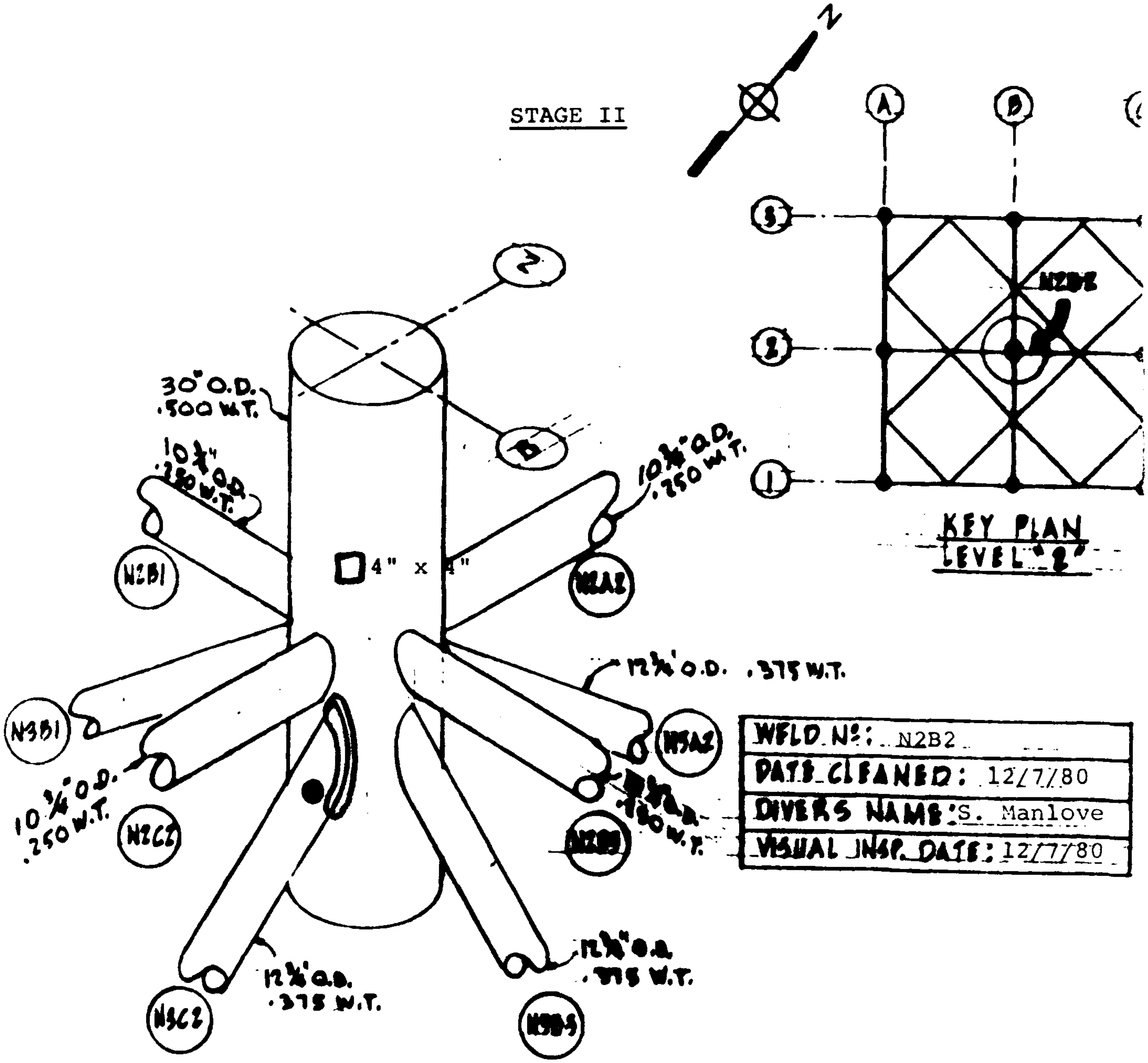


Fig. 2.2.22

STAGE II



NOTE: Diver was unable to detect hole prior to blasting, due to marine growth.

CP 656, 658
Bio-Fouling ½"

Weld area at 7:00 -
Hole at 9:00 on brace.
100% pitting on brace.

Fig. 2.2.23

The level 2 junction of the B-2 vertical diagonal down to N3C2 on 9:00 side (above). Lower photo includes more of holes in brace. The extreme thinning of metal surrounding the holes indicates they were caused by chaffing.

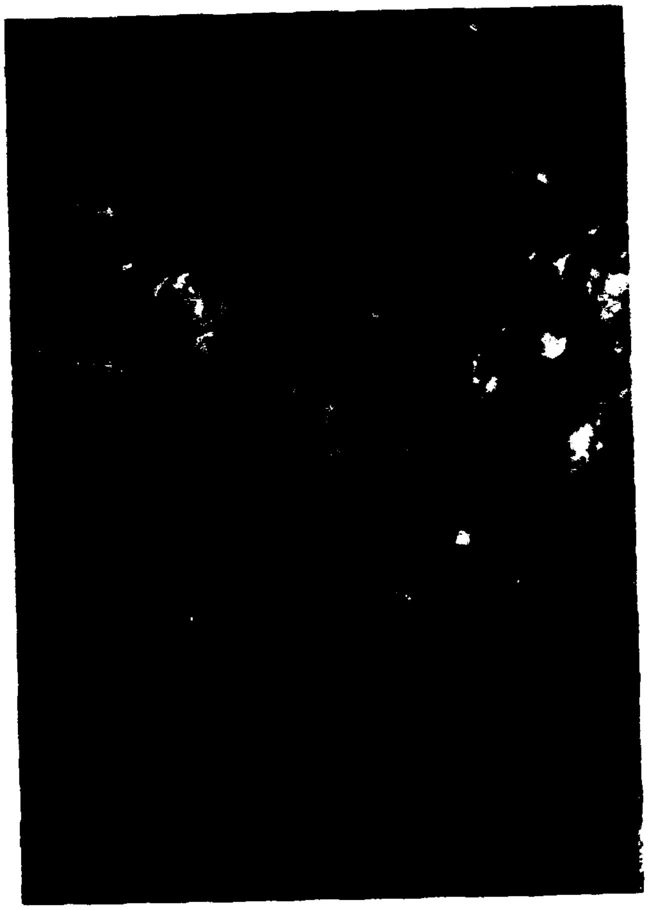


Fig. 2.2.24

The same junction, upper 9:00 side (above) and 3:00 side (below). Extensive pitting and concavity are obvious as are severe pits in the uncleaned area on the leg and in the cleaned areas on leg and brace. Anode cable is evident in upper picture.

Fig. 2.2.25

Close-ups of pitted weld at 10:00 (above) and deteriorated weld and base metal of leg at 4:00 (below).

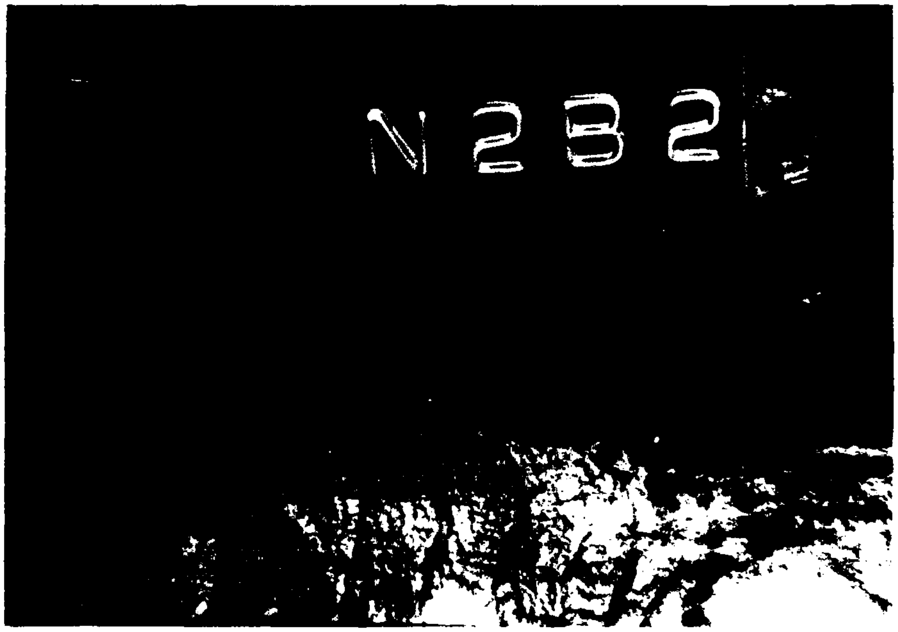
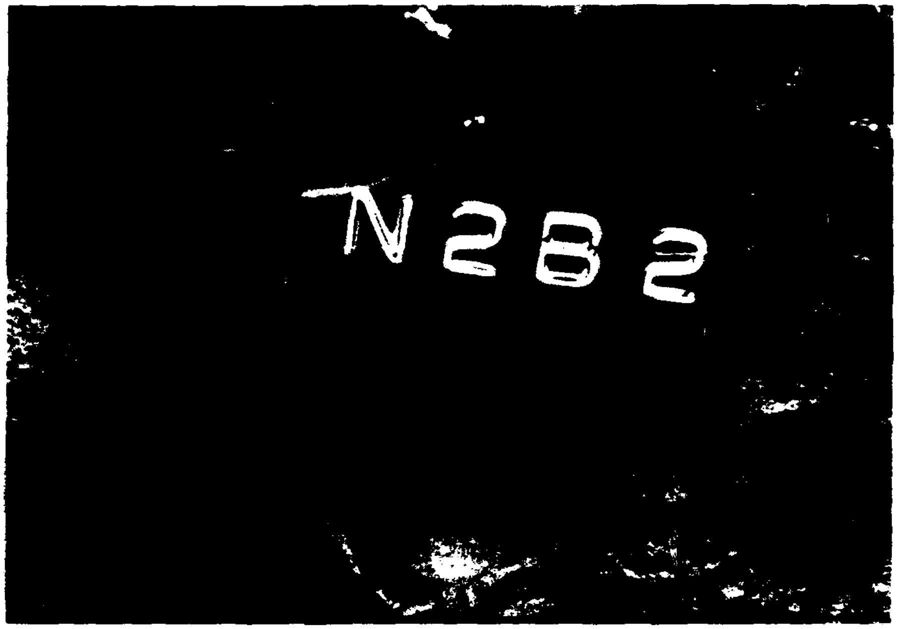


Fig. 2.2.26



Examples of severe base metal pitting in the B-2 brace down to N3C2.

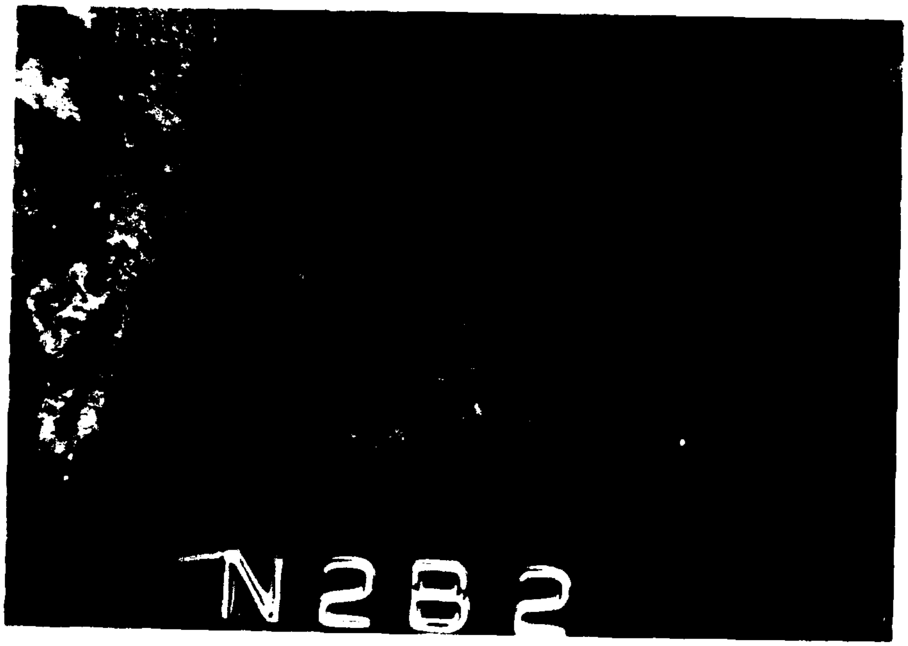
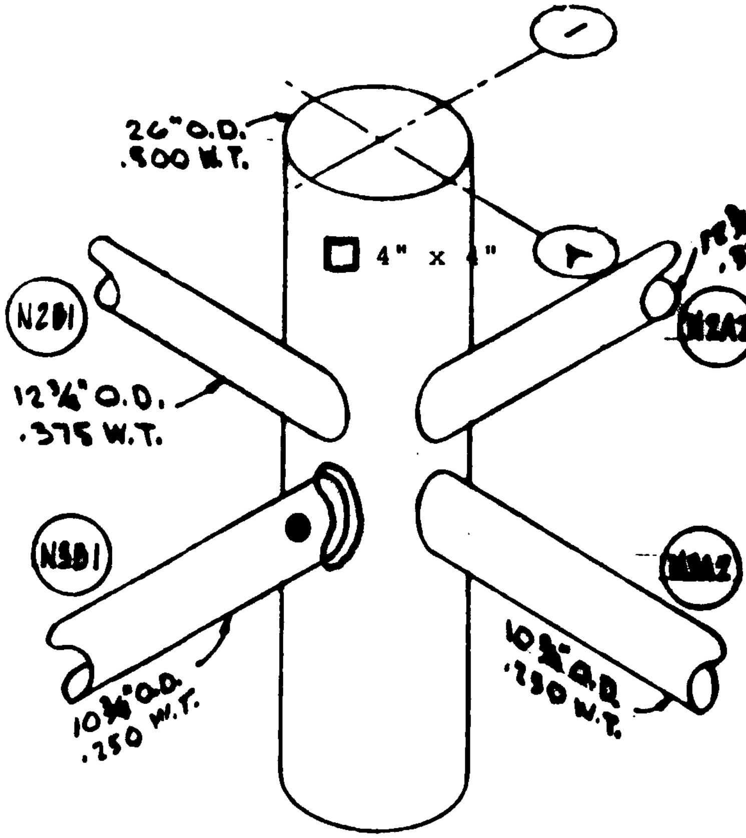


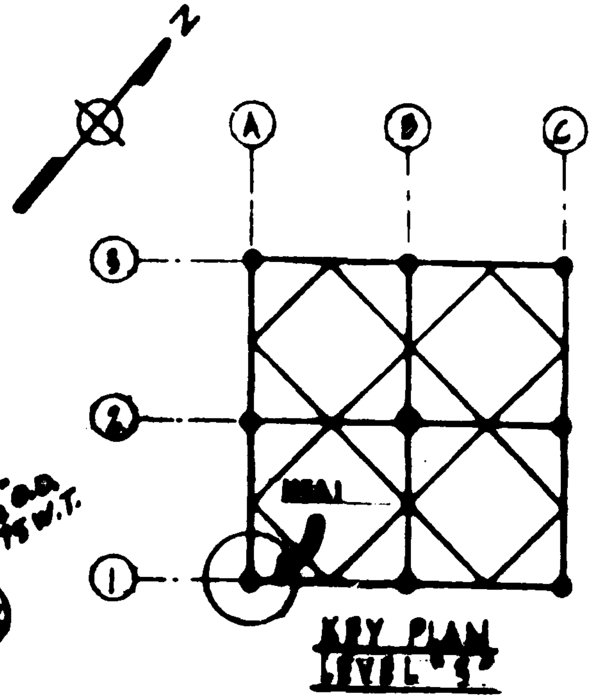
Fig. 2.2.27

The cleaned 4" x 4" area on the leg shows general, severe metal loss. The pitting directly above the identification tag in upper photo is shown in the close-up below.

Fig. 2.2.28

STAGE II





WELD No:	N3A1
DATE CLEANED:	12/7/80
DIVERS NAME:	J. Lemoine
VISUAL INSP. DATE:	12/7/80

CP 660, 698
Bio-Fouling ½"

4" x 4" sq. 1' above mudline
90% pitting.

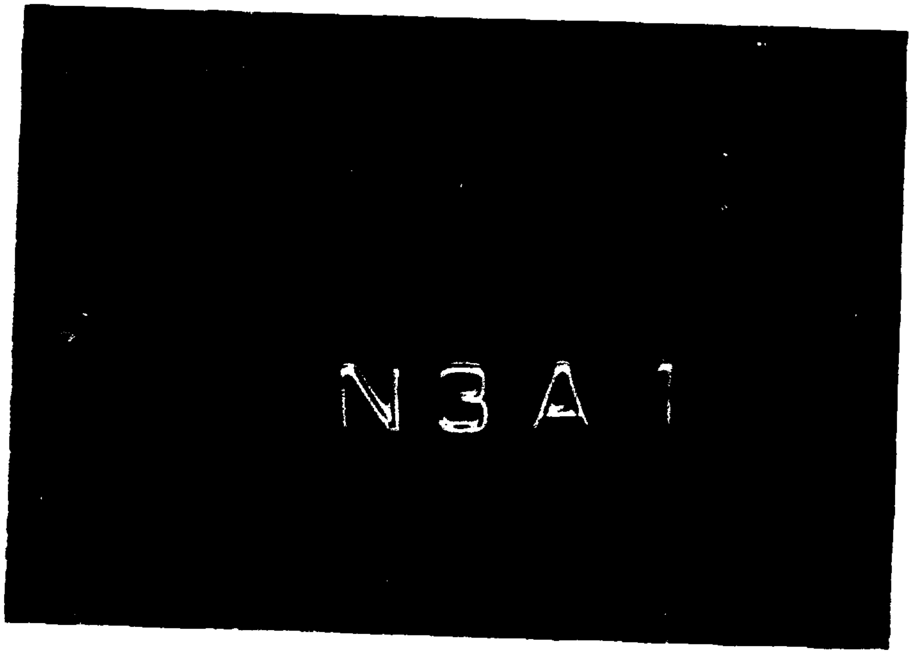
4" x 4" sq. 1' above mudline
Wide angle.

Weld at 12:00
Heavy pitting on node.

Fig. 2.2.29

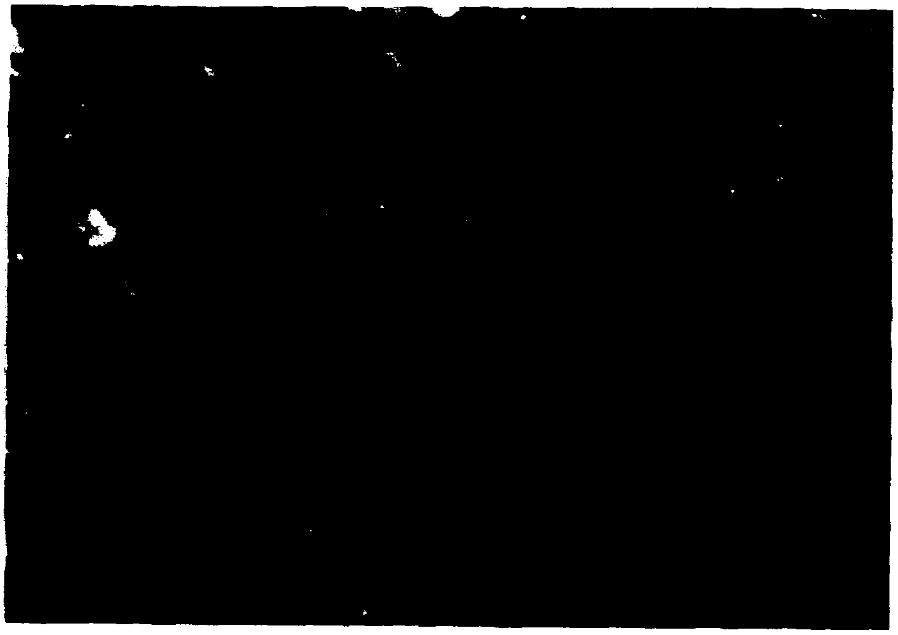
At level 3, the A-1 horizontal to N3B1 at 12:00 (above) and 3:00 (below). Little cap texture remains at 12:00, but the fairly regular cap texture is obvious under the rust on the 3:00 side. Base metal loss in the leg is widespread.

Fig 2.2.30



Close-ups of same weld at 2:00 (above) and 10:00 (below). Note loss of cap bead thickness compared to that shown on upper 3:00 side in previous figure.

Fig. 2.2.31



Cleaned area on leg A-1 up 1 foot from the mudline. Portion shown above is also shown to right of center on upper edge of photo below. The surface is 90 per cent covered with pitting.

Fig. 2.2.32

Miscellaneous debris lying in the mud at the base of the platform.

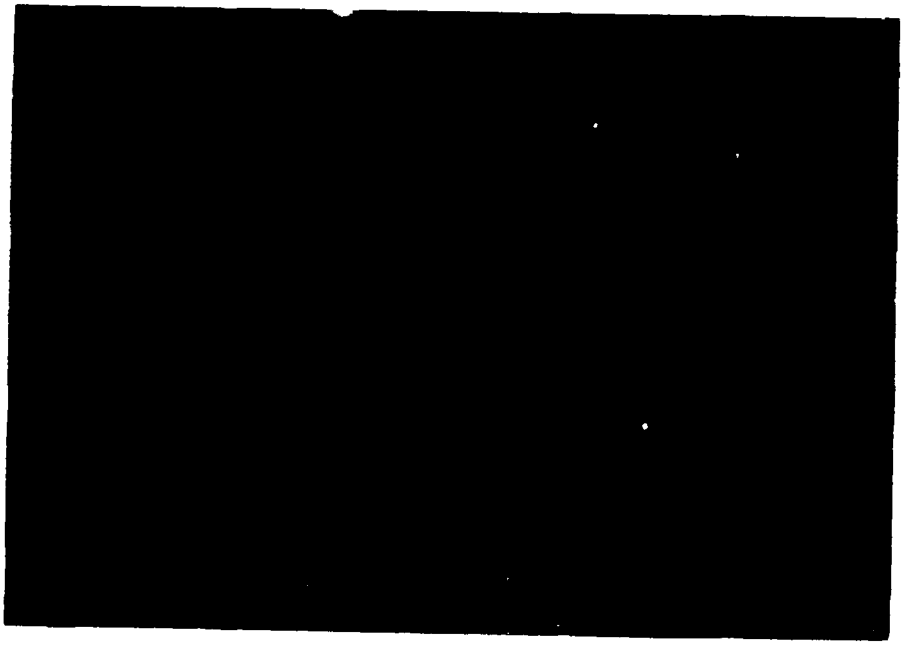
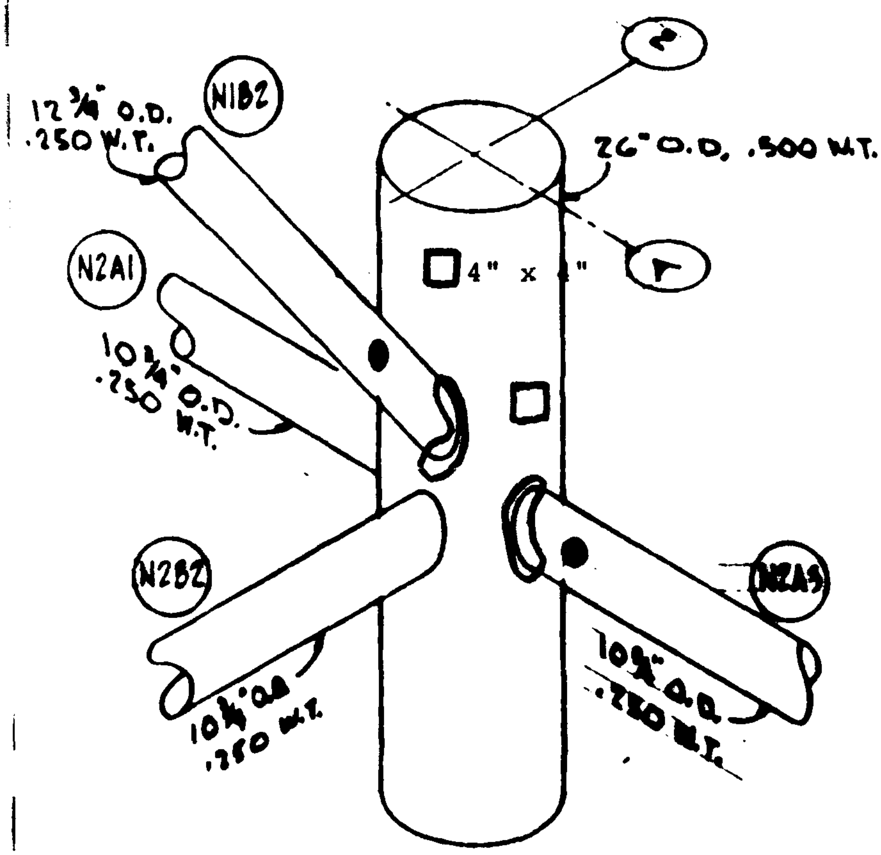
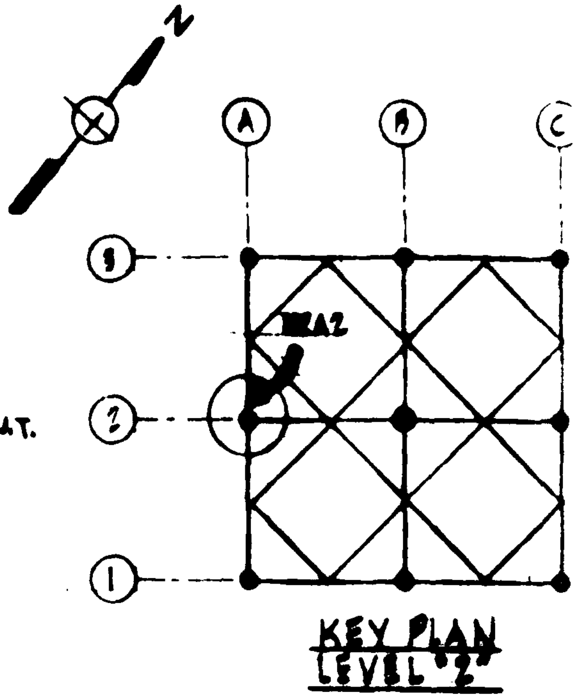


Fig. 2.2.33

STAGE II





WELD NO:	N2A2
DATE CLEANED:	12-7-80
DIVERS NAME:	S. Manlove
VISUAL INSP. DATE:	12-7-80

NOTE: Diver reports that he was unable to detect damage noted above prior to water blasting, due to marine growth.

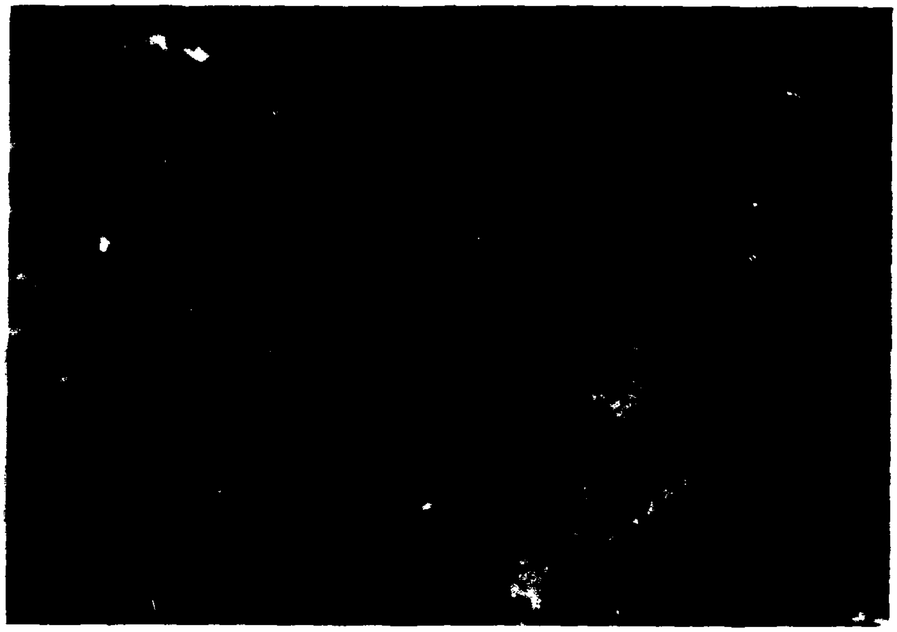
CP 649, 651
Bio-Fouling ½"
N2A2 to N2A3 - Crack in weld at 3:00, 6:00, and 7:00.

CP 657
Bio-Fouling 1"
N2A2 to N1B2 - Large pits on brace at 5:00.
Holes in brace at 9:00.

Fig 2.2.34

The level 2 junction of the A-2 horizontal to N2A3. The crack on the brace side of the weld appears widest at 6:00 and there is a fish in a hole in the brace toward 7:00 (above). Below is the end of the crack at 7:00.

Fig. 2.2.35



Crack in the junction of the horizontal to A-3 beginning at 3:00 and widening toward 6:00 (above). Below is an additional view of the lower 9:00 side of the crack. Note widespread, shallow base metal loss in the brace.

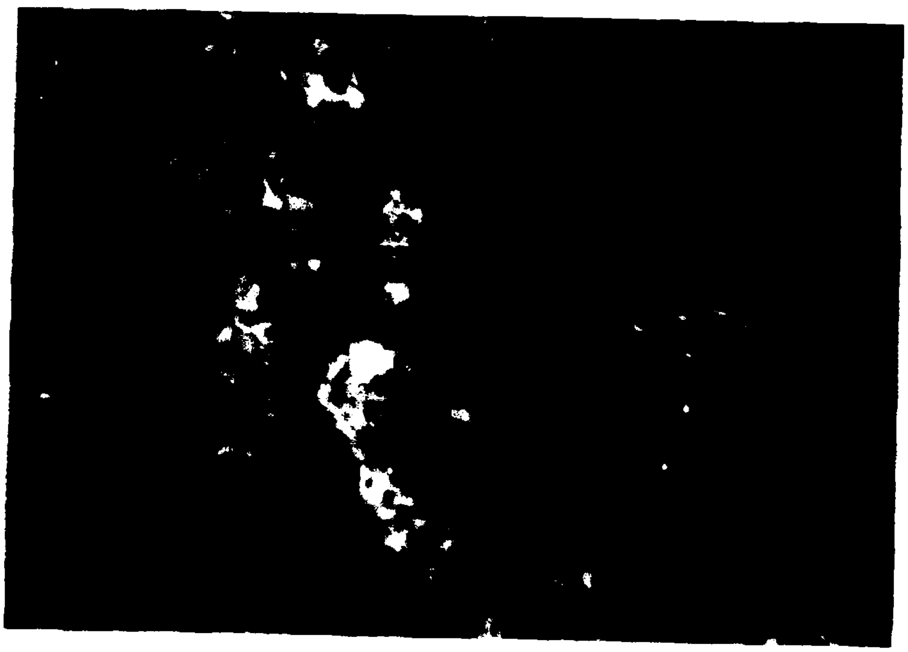
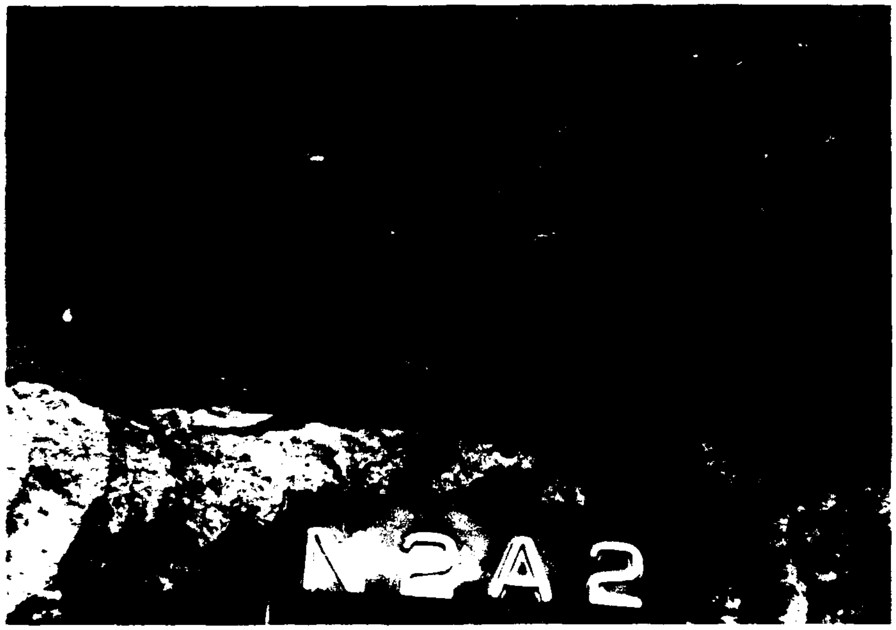


Fig. 2.2.36



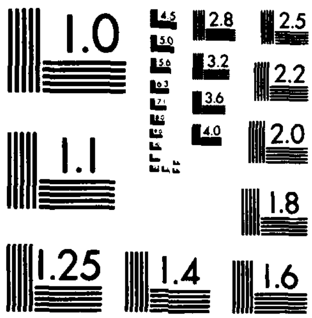
Above is end of crack extending into the weld slightly at 7:00. Below is uncracked weld at 8:00. Both locations are included in the wide-angle shot of 9:00 side of junction on previous page. Note brace metal deterioration in lower photo.

Fig 2.2.37

Wide-angle view of cleaned area on leg A-2 above the horizontal to A-3. Some of the widespread surface metal loss is estimated to be at least 1/4 inch deep.

Fig. 2.2.38

AD-A180 701 STAGE I AND II PLATFORM STRENGTH EVALUATION OFFSHORE 3/3
PANAMA CITY FLORIDA(U) BARNETT AND CASBARIAN INC
METAIRIE LA FEB 81 CHES/NAVFAC-FPO-8331A
UNCLASSIFIED N62477-80-C-0194 F/G 13/10 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

The upper 3:00 side of the A-2 brace up to N1B2 (above) and corrosion holes in generally deteriorated metal of the brace on the 9:00 side (below).

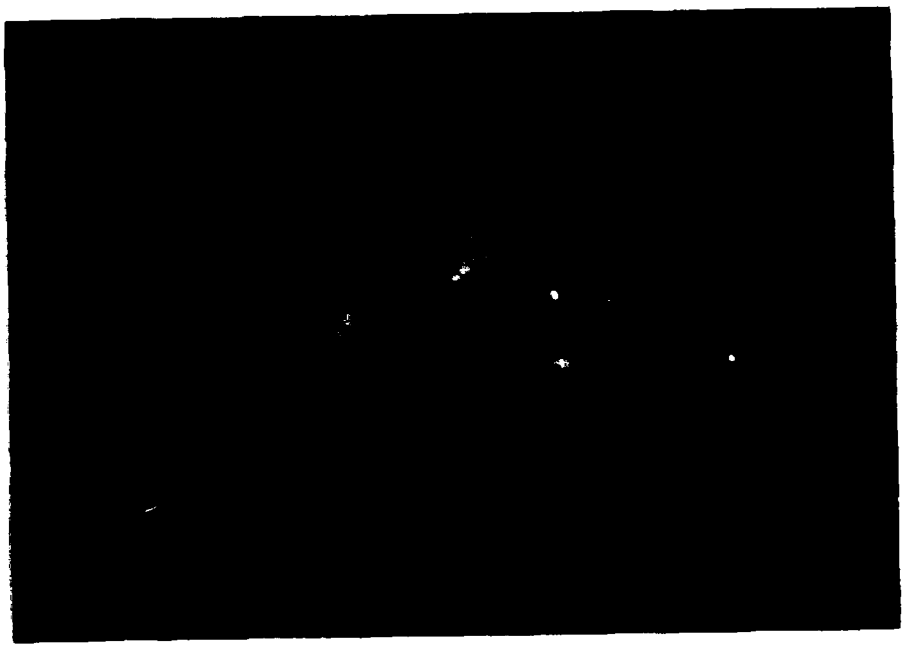


Fig. 2.2.39

Close-ups of pits next to the same weld at 7:00 in the brace (above) and in the leg on the upper 3:00 side (below).

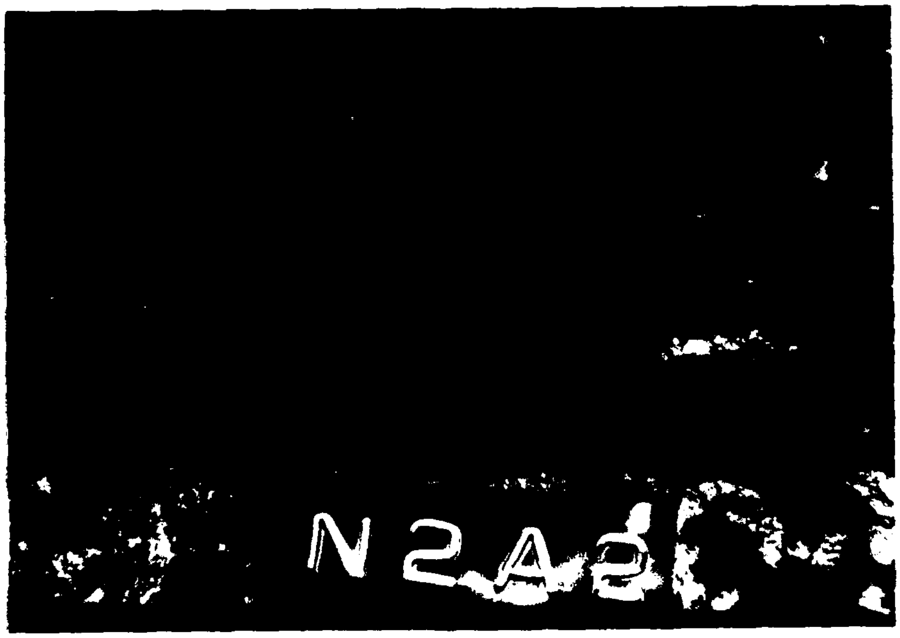


Fig. 2.2.40

Wide-angle and close-up views of another 4" x 4" area cleaned on the leg above the vertical diagonal up to B-2, level 2. Although portion shown below is not representative of severe loss, the wide-angle view includes large, distinct pits.

Fig. 2.2.41