1985

NORTON CORROSION LIMITED, INC.

ENGINEERING REPORT

FINAL INSPECTION REPORT

CITY AND BOROUGH OF JUNEAU
JUNEAU PARKING FACILITY
CATHODIC PROTECTION SYSTEM
JUNEAU, ALASKA

PREPARED FOR: CITY AND BOROUGH OF JUNEAU
Attention Mr. Bud Jones
155 S. Seward
Juneau, AK 99801

PREPARED BY:
Stuart Jon Ell
Field Engineer

APPROVED BY:
John S. Tinnea
Senior Project Engineer

March 28, 1985

OK JDW 4-8-85

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CITY AND BOROUGH OF JUNEAU
JUNEAU PARKING FACILITY
CATHODIC PROTECTION FACILITY

1.0 INTRODUCTION:

NCL has completed an engineering inspection of the Juneau Parking Facility cathodic protection system. Authorization to proceed with this inspection was given by Mr. Bud Jones, Construction Engineer, by telephone conversation on March 1, 1985.

2.0 DESCRIPTION:

The parking facility is supported by an array of piles extending into Gastineau Channel. The corrosion control design is of the galvanic type utilizing aluminum sled anodes for the submerged steel piles and prepackaged magnesium anodes for the buried steel piles.

3.0 THEORY:

In order for a pier to be cathodically protected as a unit, it is essential that all piles are in good electrical contact with each other. Special bonding straps must be used to interconnect the piles. All bonds, exposed copper wire, and bare steel must be coated.

When dissimilar metals are bonded together in a conductive environment, corrosion currents may occur. In this case, any uncoated bonds in the concrete pile caps may corrode. The concrete is located near enough to seawater (splash zone) to absorb chlorides which will lower its resistivity. In this environment the steel will tend to corrode to protect the copper in close proximity. Over the years, the corrosion by-products could create internal pressures that will crack and delaminate the concrete. This localized corrosion cell will progress and eventually destroy the

copper to steel bond. This broken bond would leave the pile unprotected. The same process of dissimilar metals is used for the protection of the unit structure. Aluminum and magnesium are used to corrode in a controlled manner to protect the steel piles.

4.0 EVALUATION:

Testing conducted by NCL personnel involved structure-to-electrolyte potentials on all submerged steel piles. These potentials were measured using a high internal impedance multimeter in conjunction with a submersible zinc reference electrode. All submerged steel piles were tested with the zinc at the surface and some were tested at 5' intervals. Random surface measurements were also taken using a copper-copper sulfate ($CuCuSO_4$) reference electrode for quality control. Sufficient tests have been conducted throughout the network of structures to ensure achievement of cathodic protection on all submerged metallic structures.

Structure-to-soil potentials were taken at the two installed test stations. These measurements were taken using the $CuCuSO_4$ reference electrode. NCL personnel were unable to conduct a thorough test of the buried steel piles. All bonds and prepackaged anodes installed according to specifications and drawings will supply corrosion control to the buried steel piles. Testing conducted at the installed test stations indicates protective current is being supplied in their immediate vicinity. These results give a representative idea of the protection to the overall buried pile configuration. Field testing results are presented on the enclosed data sheets.

Amperage being supplied to the unit structure was measured through the installed shunts. Anode sled #1 was supplying 1.9 amps and anode sled #2 was supplying 2.2 amps. The anode current requirements are directly proportional to the integrity of the pile coating. The more metal exposed to the electrolyte the more current required for protection. The cathodic protection design installed will automatically supply the protective current required. The anode life is dependent on this fluctuating current output.

Nominal life of these anode sleds is in excess of 25 years as calculated from current output tested at 9:00 a.m. on March 12, 1985.

5.0 ANNUAL INSPECTION:

NCL recommends an annual inspection of the cathodic protection system. The purpose of a regular inspection is to monitor the anode outputs and to detect any physical damage to the system.

NORTON CORROSION LIMITED

JUNEAU PARKING FACILITY
CATHODIC PROTECTION SYSTEM

DATA SHEET #1
NCL JOB #E-9028
DATE: 03/11/85
BY: S.J. ELL

PILE-TO-WATER POTENTIALS

Pile Location (See Plan CP-1)	Depth	Potential (Volt) Reference Cell Zinc	$CuCuSO_4$
Bent A			
Pile 9	Surface	+0.330	-0.750
	5'	+0.330	
	10'	+0.330	
	15'	+0.330	
	20'	+0.330	
	25'	+0.330	
	30'	+0.335	
	35'	+0.335	
	Bottom	+0.335	
Pile 8	Surface	+0.370	
Pile 7	Surface	+0.370	
Bent B			
Pile 9.7	Surface	+0.320	
Pile 9	Surface	+0.315	
Pile 8	Surface	+0.335	
Pile 7	Surface	+0.350	
Bent B.7			
Pile 9.7	Surface	+0.345	
Pile 9	Surface	+0.340	
Bent C			
Pile 10	Surface	+0.350	-0.750
	5'	+0.350	
	10'	+0.350	
	15'	+0.350	
	20'	+0.350	
	25'	+0.350	
	30'	+0.350	
	35'	+0.350	
	Bottom	+0.350	
Pile 9.7	Surface	+0.320	

NORTON CORROSION LIMITED

JUNEAU PARKING FACILITY
CATHODIC PROTECTION SYSTEM

DATA SHEET #2
NCL JOB #E-9028

Pile Location (See Plan CP-1)	Depth	Potential (Volt) Reference Cell Zinc	$CuCuSO_4$
Pile 9	Surface	+0.320	
Pile 8	Surface	+0.355	
	5'	+0.355	
	10'	+0.355	
	15'	+0.355	
	20'	+0.355	
	Bottom	+0.355	
Pile 7	Surface	+0.340	
Bent C.5			
Pile 11	Surface	+0.360	
Pile 10	Surface	+0.360	
	5'	+0.360	
	10'	+0.360	
	15'	+0.360	
	20'	+0.360	
	25'	+0.360	
	30'	+0.360	
	35'	+0.360	
	Bottom	+0.360	
Pile 9.7	Surface	+0.355	
Pile 9	Surface	+0.355	
Pile 8.5	Surface	+0.355	
Pile 8	Surface	+0.355	-0.750
	5'	+0.355	
	10'	+0.355	
	15'	+0.355	
	20'	+0.355	
	25'	+0.355	
	Bottom	+0.355	
Pile 7.5	Surface	+0.355	
Pile 7	Surface	+0.355	
Pile 6.5	Surface	+0.360	
	5'	+0.360	
	10'	+0.360	
	15'	+0.360	
	20'	+0.360	
	25'	+0.360	
	Bottom	+0.360	

PART 1 - GENERAL

1.01 WORK INCLUDED

This Section covers the work necessary for installation of an aluminum galvanic cathodic protection system for the salt water exposed pilings of the Marine Park Parking Garage. The work includes installation of 6 anodes and the attendant cable and hardware. The work also includes the installation of a reference cell and test station at the south-west end of the building. Approximate locations of the work are shown on Sheet 1 of the Drawings. Aluminum anode installation details are shown on Sheets 2 and 3 of the Drawings. Reference cell details are shown on Sheet 4 of the Drawings.

1.02 RELATED WORK IN OTHER SECTIONS

A. General

Work necessary to complete this Section shall not interfere with other construction activities nor with the continued operation of the Marine Park Parking Garage of the City and Borough of Juneau (CBJ) Public Library.

B. Timing

Work necessary to complete this Section must be completed within the time specified in the General Conditions of this Request for Quotation.

C. Coordination

Activities associated with this Section will involve coordination with the Staff of the CBJ Engineering Department and the staff of the CBJ Public Library. The Contractor shall be responsible for coordination with these Departments and securing their advanced approval of construction scheduling, staging and material storage.

1.03 DEFINITIONS

Definitions for Cathodic Protection Terminology are as contained in the NACE International "Corrosion Engineer's Reference Book," latest edition.

1.04 SUBMITTALS

A. Material Approval

The Contractor shall provide the Engineer all information necessary to confirm that the products to be used meet the requirements of this Section. The Contractor must receive written acceptance from the Engineer of the materials submitted prior to beginning material installation. Materials that require submittals include, but are not limited to the following:

anodes	anode cable	cold applied mastic
soil reference electrode	test station	thermite weld materials
thermite weld caps		

B. Procedure Approval

The Contractor shall provide the Engineer all information necessary to confirm that the methods and procedures to be used meets the requirements of this Section. Submittals shall be made to the Engineering Department, City and Borough of Juneau, Alaska, or its designate.

1.05 QUALITY ASSURANCE

A. General

The firm performing the work shall each have a minimum of five years documented experience in the successful application of their respective trades.

PART 2 - PRODUCTS

2.01 GENERAL

A. Aluminum Anodes

The metal used to fabricate the anodes shall be an aluminum-zinc-indium alloy of the following composition:

ELEMENT	%	ELEMENT	%	ELEMENT	%
zinc	2.80-6.50	indium	0.010-0.020	silicon	0.20 (max)
copper	0.006 (max)	iron	0.12 (max)	aluminum	balance

The alloy shall have a closed circuit potential -1.150V, in ASTM D-1141 artificial seawater, to a Cu/$CuSO_4$ reference and at an applied current density of 4mA/in². The alloy shall have a nominal current capacity of 1,150 amp-hr/lb, a nominal consumption rate of 7.62 lb/amp-yr and an alloy efficiency of 85%.

The anodes shall be a "pipe-through" design that employs a 2-inch diameter schedule 80 mild steel core. The anodes shall have 325 net pounds of available aluminum alloy. The anode geometry shall be such so as to provide a maximum calculated resistance of 0.21 ohms in 87.5 ohm-cm saline mud, using Dwight's modified equation.

Resistance (from Dwight's Equation): $$Resistance = \frac{\rho}{2\pi L}\left[\ln\left(\frac{4L}{R}\right) - 1\right]\left(\frac{1\text{ in}}{2.54\text{ cm}}\right)$$

Where, $R = \sqrt{\frac{\text{cross section area}}{\pi}}$, L = anode length and ρ = resistivity (87.5 ohm-cm.)

The anodes shall be American Corrosion Services, Inc., alloy ACS-4, drawing 2031B, or approved equal.

Anodes shall be supplied with lifting eyes securely attached to the steel pipe core. A galvanized steel lifting chain shall be fitted to the anode eye. The chain shall be of sufficient length to run on the bottom from the anode to its respective pile and then up the pile to elevation 0.0. The chain shall be attached to an eye at elevation 0.0 (see Sheet 2).

B. Anode Cable

Cables from the anode to the piles shall be AWG# 4 stranded copper with HMW/PE type CP insulation. The existing cables shall be used for anodes placed near pile clusters B-9 and B.7-9.

C. Cold Applied Mastic

The cold applied mastic shall be Kop-Coat® Bitumastic No. 50 protective coating.

D. Soil Reference Electrode

The soil reference electrode shall be a SlimLine® Model US-AGG-SW underground reference electrode manufactured by Electrochemical Devices, Inc. (EDI), or approved equal.

E. Test Station

The test station shall be a flush-to-grade cathodic protection test station. The test station shall be a Flush Fink® manufactured by Cott Industries, or approved equal.

F. Thermite Weld Materials

The molds, charges, cable selves and any additional materials shall meet the recommendations of the thermite weld material manufacturer for attaching stranded copper cables to steel surfaces. Thermite welding equipment shall be an Erico Industries Cadweld® or approved equal.

G. Thermite Weld Caps

The thermite weld caps shall be Royston Handy Caps® or approved equal.

PART 3 - EXECUTION

3.01 INSPECTION

Examine areas and conditions under which the work is to be performed. Commencing work indicates the Contractor's acceptance that all existing conditions are as stated and are satisfactory.

3.02 PREPARATION

A. Removal of Impediments

Removal of impediments attendant to performing the work shall be the responsibility of the Contractor.

B. Protection of Adjacent Areas

Protection of areas adjacent to the work area, the visiting public and Library Staff shall be stringently controlled during this work. The Contractor shall be responsible that the activities,

staging or storage related to this work does not interfere with ongoing uses of the Marine Park Parking Garage, the CBJ Public Library or the continued operation of the dock.

3.03 EQUIPMENT

Blasting equipment will not be allowed for removal of coatings and corrosion product from piling. Scalers, needle guns and bristle brushes shall be used for that purpose. Equipment employed by the Contractor shall meet or exceed the requirements listed elsewhere in this Specification.

3.04 PROCEDURES

A. Connection of Anode Cables to Piling

Two anode cables are in existence at the facility and are already connected to the piling. These two anode cables shall be used to for the anodes placed near pile clusters B-9 and B.7-9.

Locations of the four other anode placements are shown in Sheet 1 of the Drawings. At each location one end of the respective anode cable shall be connected to the interior face of a pile web in the adjacent pile cluster as shown in Sheet 2. At pile clusters an interior web face fronts toward the center of its pile cluster. For anodes installed on the C.5 and D lines, an interior face is one that faces towards shore. The connection shall be within 3-ft of the respective pile cap bottom. The thermite weld process shall be used to make the connection.

For all locations no more than 2-inches of insulation shall be removed from the cable to make the connection to the piling.

The area where the welding is to be performed shall be clean and free from dirt, rust and oil. On each pile a 3-inch x 3-inch area of steel shall be cleaned to bright metal. The thermite weld shall be made in strict accordance with the manufacturer's instructions. The size of the mold and charge employed, the use of cable sleeves or packing material shall be as recommended by the manufacturer to successfully weld an AWG# 4 stranded copper cable to a vertical flat steel plate.

After welding, the weld area shall be cleaned of all slag. The weld will be judged successful if it can withstand a moderate oblique blow from a 2 pound hammer and a moderate in-line pull on the cable.

The weld area and adjacent cable and 3-inch x 3-inch are of bare steel shall be coated with the thermite weld cap primer. No copper or weld material shall be left uncoated. The thermite weld cap shall be installed in accordance with the manufacturer's instructions.

If after installation of the weld cap any piling steel coating damage was not covered by the weld cap, that damage and/or exposed steel shall be coated with the cold applied mastic.

The attached cables shall not be left hanging or allowed to become submerged in seawater. The cables shall not be used to handle, move or place the anodes.

B. Connection of Anode Cables to Anodes

One AWG# 4 anode cable shall be connected to one end of each the six aluminum alloy anodes that are to be installed during the course of this work. The connection shall be made to one end of the steel core (schedule 80 pipe) which extends from each end of the anodes.

The connections shall be no closer that two-inches nor more than 4-inches from the selected end of the steel core.

For the anodes located at pile clusters B-9 and B.7-9 one foot of the existing cable shall be removed prior to attaching anodes. For all locations no more than 2-inches of insulation shall be removed from the cable to make the connection to the anodes.

The area where the welding is to be performed shall be clean and free from dirt, rust and oil. The steel shall be cleaned or filed to bright metal. The thermite weld shall be made in strict accordance with the manufacturer's instructions. The size of the mold and charge employed, the use of cable sleeves or packing material shall be as recommended by the manufacturer to successfully weld an AWG# 4 stranded copper cable to a 2-inch diameter, schedule 80 steel pipe. As installed, the anode cable shall run longitudinally with and away from the anode.

After welding, the weld area shall be cleaned of all slag. The weld will be judged successful if it can withstand a moderate oblique blow from a 2 pound hammer and a moderate in-line pull on the cable.

The weld area and adjacent cable and steel core shall be coated with the cold applied mastic. No copper or weld material shall be left uncoated. Coating of the cable and steel core should extend 2-inches, minimum, from the weld.

The attached cables shall not be used to handle, move or place the anodes.

C. Running Cables

The four cables installed in the course of this work shall be run, down the interior web of the pile to which they have been attached, to their respective anode. The two exiting cables shall be run to their respective anodes down an interior web of one of the piles at clusters B-9 and B.7-9.

The Contractor shall exercise care during installation to avoid nicks, cuts or other damage to the anode cables. Each anode cable shall be secured by three clips. The uppermost clip will be located 5-feet below the bottom of the cable's respective pile cap (approx. elev. 15 ft). The second clip will be located at Elev. 7, approximately 2 feet above the pile cross bracing on lines C, C.5 and D. The lowest clip will be set at a maximum elevation of Juneau, Alaska MLLW, Elev. 0.0ft.

The anode wire clips shall be made of 1-inch x 1/8-inch galvanized mild steel flat stock. The clips shall be bent to a block "U" shape as shown in Sheet 2. The clip lips shall have sufficient depth so that the cable will be fully enclosed by the clip-stud-web combination.

The clips shall be attached to the piling with 3/8-inch - 16 x 2-inch zinc plated studs. The studs may be either velocity-type or welded-type.

If welded types are used the web ends of the studs should be free of zinc prior to welding. At the installation location a two-inch x two-inch area of the pile web shall be cleaned to bright metal prior to welding. Welding should be accomplished using a manufactured stud welding system. Surface preparation, and welding should be performed in accord with relevant AWS specifications.

Any area of the clips or studs where the zinc covering is damaged or steel is exposed shall be touched-up by coating with a low-melting zinc alloy. All welded areas shall also be

touched up in a similar fashion. The zinc alloy bars used shall be specifically designed for such application.

The clips shall be held in place with appropriately sized galvanized steel lock washers and galvanized steel nuts. Care shall be taken in tightening the stud nuts to avoid any damage to the cable insulation.

D. Installation of Aluminum Anodes

The Contractor shall furnish and install the aluminum alloy anodes as shown on the Drawings. The anodes shall have sufficient cable to allow their placement 10-feet from the nearest steel pile. No anodes shall be installed within the confines of a pile cluster. The contractor shall use the lifting chain attached to the lifting eye to lower each anode. Dropping the anodes is not acceptable. The Contractor shall not use the anode cable to either guide or lower the anode. After installation, the Contractor shall secure the chain used to lower each anode to the respective eye at elevation 0 on the respective pile (see Sheet 2).

E. Installation of Reference Electrode

One reference electrode shall be installed at a location shown on Sheet 1. The reference electrode shall be installed in strict accordance with the manufacturer's instruction. Any pre-installation conditioning shall be carefully followed. The method of installing the electrode, including any type of casing to be used, shall be determined by the Contractor and submitted to the Engineer before work is started.

The reference electrode shall be installed in a 2-inch minimum diameter hole. The hole shall be maintained open and the reference electrode installed at the final level 35-feet below grade if that location is a minimum of 5-feet below the A-J rock fill. If the location at 35-feet below grade is not 5-feet below the lower boundary of the A-J rock fill the Contractor shall continue to until that 5-foot minimum has been reached. Any depth up to and including 50 feet shall be drilled and completed by the Contractor at no additional cost to the CBJ. The Contractor shall not proceed beyond 50 feet without authorization from the Engineer.

The reference electrode shall be secured by a slurry mix. The slurry mix shall be a dry weight mix of 75% sand plus 25% bentonite. Water shall be added to achieve a pourable consistency. The slurry shall be placed so that it surrounds the electrode and extends to a level 1-foot above the electrode (see EDI drawing USAPP1). Fill the balance of the hole with suitable backfill.

The cable shall be run underground from the installation location to the test station. Installation shall be direct burial at a level 2-ft below that of the adjacent surface. A yellow buried utility marking ribbon shall be run directly above the cable at a level 6-inch below that of the surface.

The Contractor shall carefully protect the integrity of the reference electrode cable. No breaks or cuts in the cable insulation will be acceptable.

F. Installation Test Station Structure Bond Wire

An AWG# 14, stranded copper wire with red XHHW insulation shall be thermite welded to a pile at cluster A-5. This wire shall serve as a test lead to the piling with soil exposure.

The area where the welding is to be performed shall be clean and free from dirt, rust and oil. On the selected pile a 3-inch x 3-inch area of steel shall be cleaned to bright metal. The thermite weld shall be made in strict accordance with the manufacturer's instructions. The

size of the mold and charge employed, the use of cable sleeves or packing material shall be as recommended by the manufacturer to successfully weld an AWG# 14 stranded copper cable to a vertical flat steel plate.

After welding, the weld area shall be cleaned of all slag. The weld will be judged successful if it can withstand a moderate oblique blow from a 2 pound hammer and a moderate in-line pull on the cable.

The weld area and adjacent cable and 3-inch x 3 inch are of bare steel shall be coated with the thermite weld cap primer. No copper or weld material shall be left uncoated. The thermite weld cap shall be installed in accordance with the manufacturer's instructions.

If after installation of the weld cap any piling steel coating damage was not covered by the weld cap, that damage and/or exposed steel shall be coated with the cold applied mastic.

The cable shall be run underground from the installation location to the test station. Installation shall be direct burial at a level 2-ft below that of the adjacent surface. A yellow buried utility marking ribbon shall be run directly above the cable at a level 6-inch below that of the surface.

The Contractor shall carefully protect the integrity of the structure bond wire cable. No breaks or cuts in the cable insulation will be acceptable.

The Contractor shall carefully protect the integrity of the structure bond wire cable. No breaks or cuts in the cable insulation will be acceptable.

G. Installation of Test Station

The test station shall be installed flush with the ground at the location shown on Sheet 1.

The reference electrode cable and structure bond wire cable shall be brought underground into the test station. As finally installed, both cables shall have sufficient slack with the body of the test station to allow the test station panel to be removed to a distance of 2-feet minimum.

The test station shall be installed in accordance with the manufacturer's instructions. Any electrical shorting bars or wires shall be removed. The Contractor shall test that upper left hand and upper right hand terminals are electrical open-circuit as installed.

The reference electrode cable shall be terminated with an "eye" lug and secured to the upper left hand terminal with a hex-head nut. That terminal shall be permanently marked "REF".

The structure bond wire cable shall be terminated with an "eye" lug and secured to the upper right hand terminal with a hex-head nut. This terminal shall be permanently marked "PILE".

H. Material Handling and Storage

1. Storage

All materials shall be stored in strict accordance with manufacturer's recommendations. The location of any on-site storage shall have prior approval of the Engineer.

2. Container Requirements

All materials shipped to the job site shall have clearly marked upon each container a minimum of the following:

a. Component Designation
b. Complete Mixing Instructions
c. Product Name
d. Component Weights, Total Combined Weights and Mixing Ratio
e. Shelf Life
f. Batch Number Containing
g. Manufacturer's Name, Address, and Phone Number
h. Hazard Warnings, ANSI Classification (formerly SPI Classification) and First Aid Instructions

I. Asphalt Pavement Repair

All asphalt pavement disturbed by installation of the test station, reference electrode, and conduit and wiring between them and the structure shall be repaired in accordance with applicable CBJ Standards.

3.05 CERTIFICATION

The Contractor shall be responsible for selection of the product(s) and system(s) he/she proposes to use. Certification will not relieve the Contractor from his/her responsibility to provide acceptable products as specified herein.

3.06 PROGRESS INSPECTION

Close inspection procedures shall be observed throughout the cathodic protection system installation process. Owner shall be represented by on-site inspection as judged necessary.

3.07 FIRST AID

A. Special Personnel Protection Requirements

The Contractor shall provide the manufacturer recommended safety protection articles to be used by all workers during all operations. These include, but are not limited to the following:

1. Splash-proof goggles shall be worn during all operations of application and use of coatings.

2. Impervious gloves, such a PVC or butyl rubber coated gloves, should be worn while applying coatings.

3. Welding glasses, hood, goggles, gloves and aprons, as appropriate when stud or thermite welding.

3. A First Aid Kit containing principally bandages, eye washes and wound cleansers and soaps shall be at the job site at all times.

3.08 CLEAN-UP

A. General

Remove all tools, unused material, debris and trenching or drilling spoils from the project site. Any portions of the Marine Park Parking Garage used by the Contractor shall be let broom clean. Disturbances to the lawn and areas south of the garage resulting from cable, reference electrode and test station installation shall be returned to their pre-construction condition at no additional cost to the Owner.

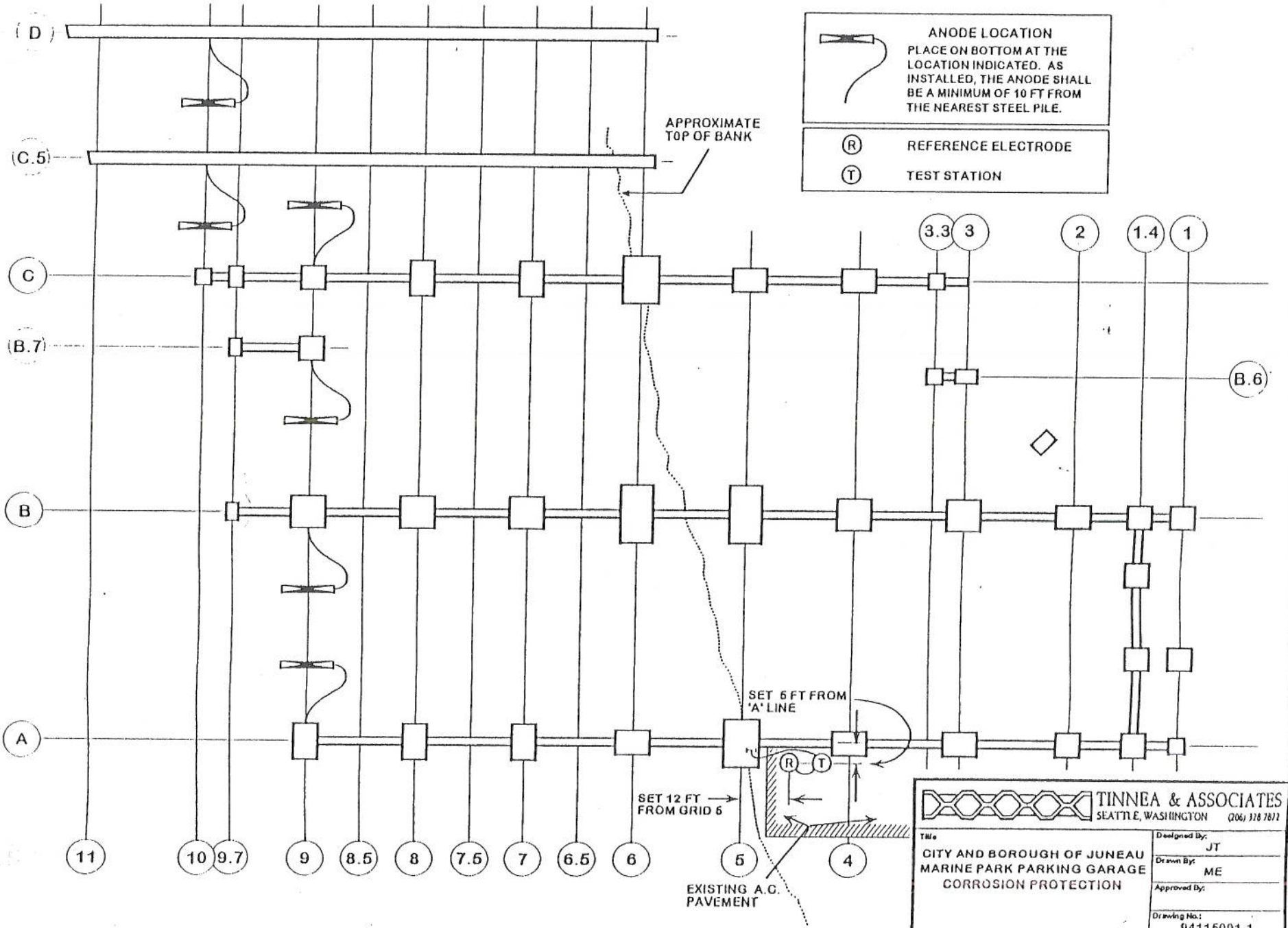
B. Removal and Transport

Responsibility for disposal of waste, unused materials and debris rests solely with the Contractor. If hazardous materials are disposed of off-site, the Contractor shall submit copies of permits from applicable Federal, State, or Municipal authorities and necessary certificates that the material has been disposed of per regulations.

PART 4 - PAYMENT

4.01 GENERAL

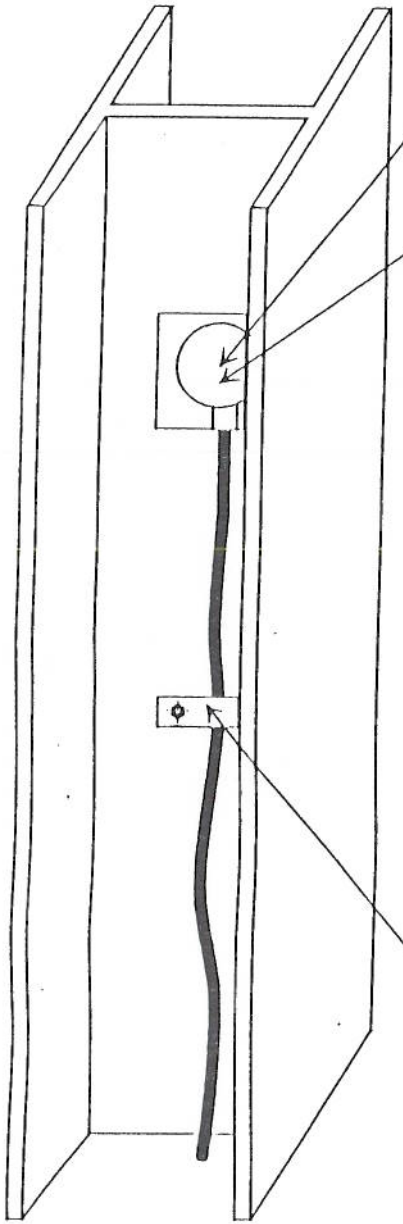
A. Payment for all work described herein shall be based on a lump sum amount as bid by the Contractor in accordance with the General Conditions of the Request for Quotation.



TINNEA & ASSOCIATES
SEATTLE, WASHINGTON (206) 328 7872

Title
CITY AND BOROUGH OF JUNEAU
MARINE PARK PARKING GARAGE
CORROSION PROTECTION

Designed By:	JT
Drawn By:	ME
Approved By:	
Drawing No.:	94116001-1
Scale: NTS	Date: 19 AUG, 94
Sheet	1 of 4



THERMITE WELD ANODE CABLE TO PILE WEB.
WELD WITHIN 3 FT OF PILE CAP

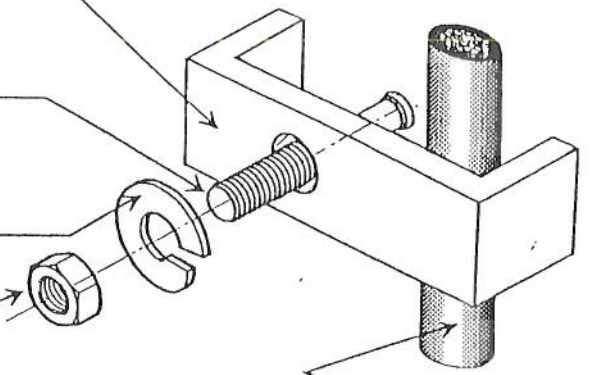
CLEAN PILE TO BRIGHT METAL BEFORE WELDING.
CLEAN WELD OF SLAG AND TEST WITH HAMMER BLOW ATER WELDING.
COAT WITH MASTIC & COVER WITH THERMITE WELD CAP TO FINISH.

WIRE CLIP,
1" x 3/16" GALV. MS,
SIZE TO FIT

GALV. MS STUD,
3/8" ϕ x 1 1/4" 16NC,
10' - 0" ON CENTER
FIT WITH EYE AT ELEV. 0

GALV. MS LOCK WASHER

GALV. MS NUT

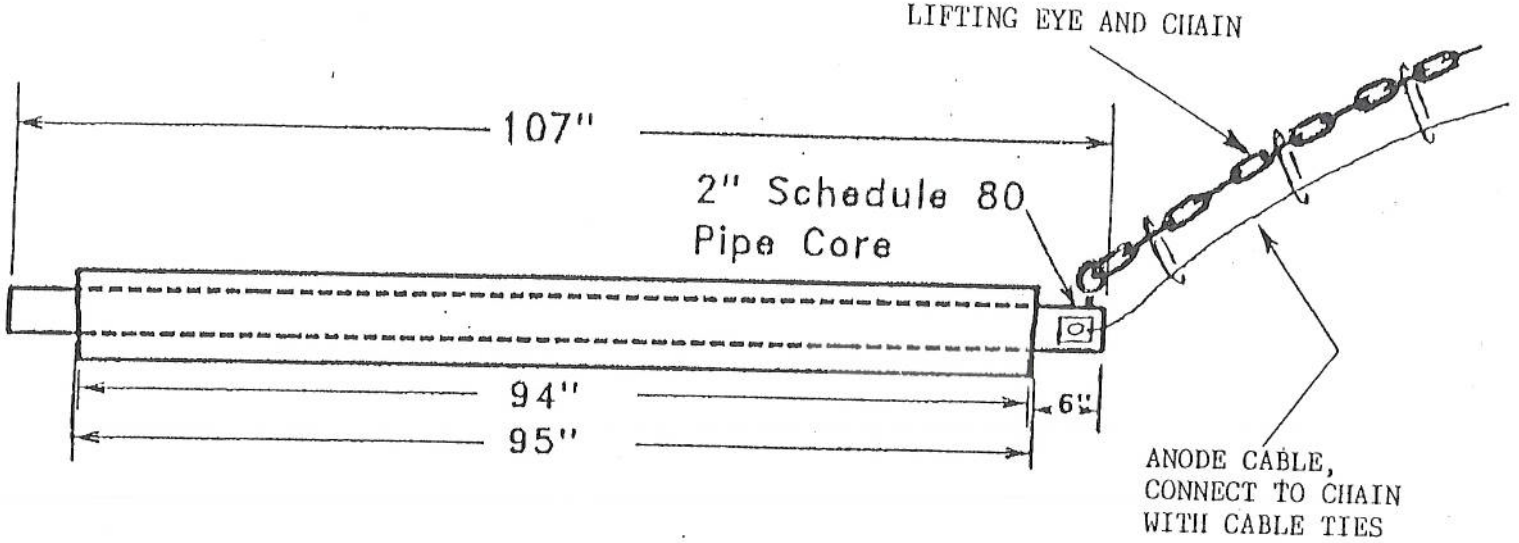


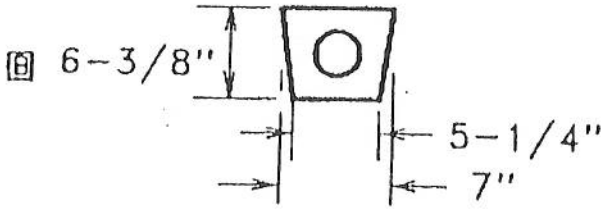
#4 AWG - STRANDED
(ARMORED)

WIRE CLIPS, 10 FT ON CENTER
SEE DETAIL

TINNEA & ASSOCIATES
SEATTLE, WASHINGTON (206) 328 7872

Title: CITY AND BOROUGH OF JUNEAU MARINE PARK PARKING GARAGE CORROSION PROTECTION	Designed By: JT Drawn By: ME Approved By: Drawing No.: 94115001-2
Scale: NTS Date: 19 AUG, 94	Sheet 2 of 4





Net Weight – 325 lb.

Gross Weight – 370 lb.

Core of A53 Grade B Steel

	Date:		Revisions
B	08/21/91	JCR	Anode height dimension.
A	07/16/91	JCR	Cross Section Dimensions

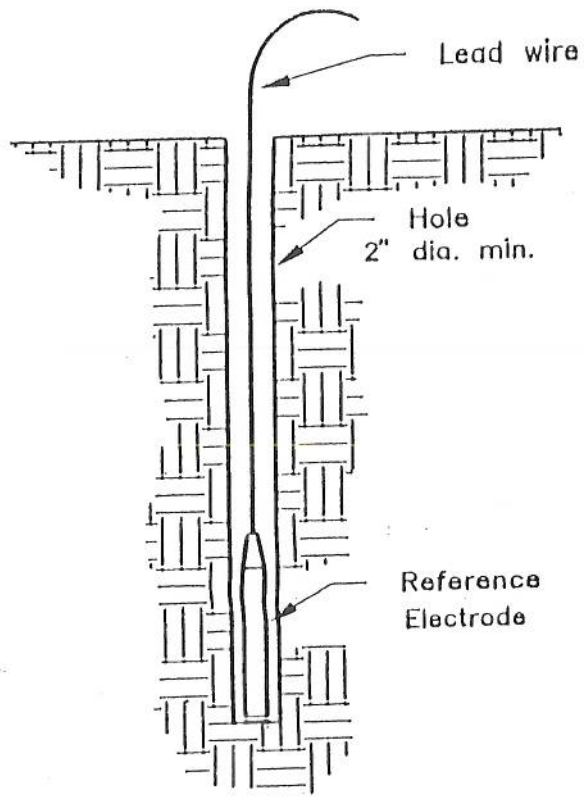
AMERICAN CORROSION SERVICES, INC.

STRAIGHT PIPE CORE

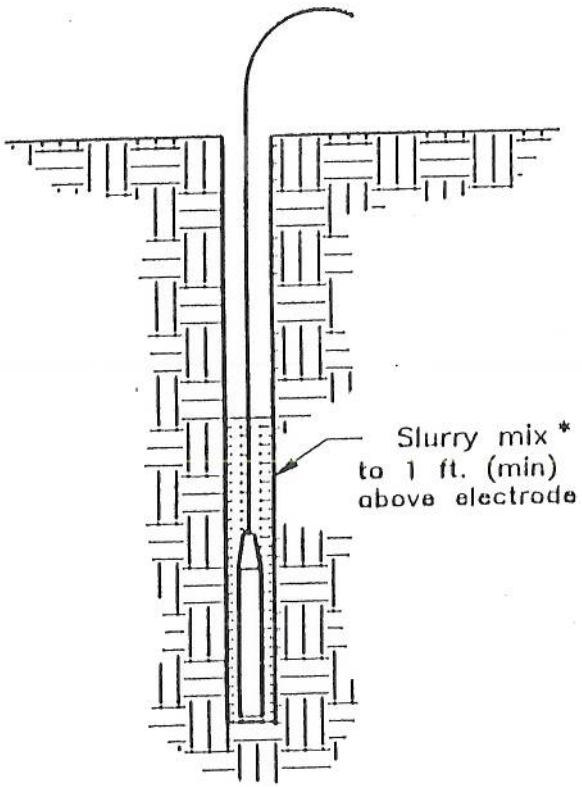
ALUMINUM ALLOY ANODE

DATE:	SCALE:	DRAWN BY:	DWG NO.:
02/01/91	NONE	JCR	2031B

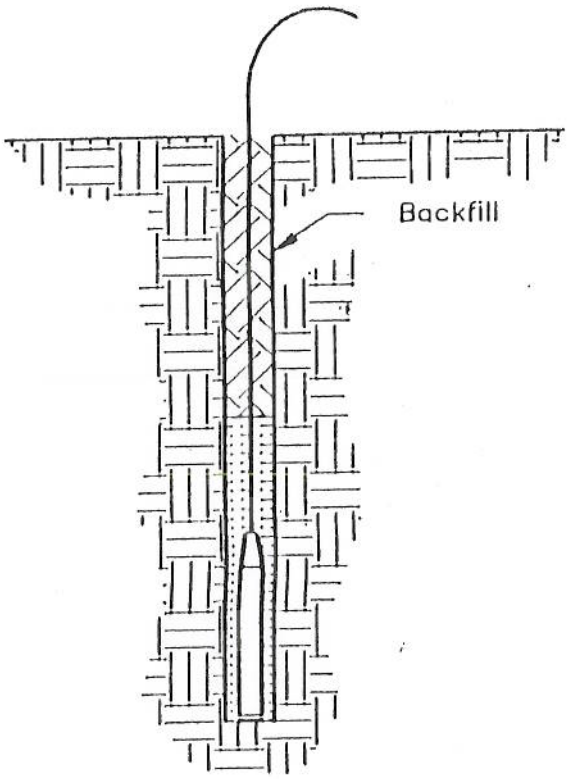
1. Drill hole 2" dia. min. Lower reference electrode into hole.



2. Pour or pump slurry mix * into hole. Fill to at least 1 foot above electrode.



3. Fill balance of hole with suitable backfill.



Slurry mix *
75% sand plus 25% bentonite clay
Add water to make pourable consistency

electrochemical devices, inc.
PO Box 31, Albion, RI 02802 401/333-6112

Model US – SlimLine™ Installation

SCALE None	DRAWN BY FJA	DATE 04/22/91	DRAWING NO. USAPP1