ECHELON ENGINEERING, INC.

Civil/Marine Consulting Engineers

Inspection and Assessment of Lutak Dock Haines, Alaska

Prepared For:

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Engineering

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Consulting Engineers

May 23, 2014

PND Engineers, Inc.
9360 Glacier Highway, Suite 100
Juneau, Alaska 99801

ATTN: Mr. Dick Somerville, P.E.
Vice President

RE: Inspection and Assessment of Lutak Dock, Haines, Alaska

Dear Mr. Somerville:

This letter is submitted to document the findings of our recent inspection of the City owned portion of the Lutak Dock, located on Lutak Inlet, Haines, Alaska. The project was carried out in support of your ongoing evaluation and rehabilitation project for the structure and specifically to focus on any conditions that might cause or contribute to sink holes and loss of backfill that is recurring along the deck.

BACKGROUND

The portion of the Lutak dock owned by the Borough of Haines was previously inspected by Echelon Engineering, Inc. in 2002. In 2003 repairs to the heavily damaged Closure Arcs which included modification of the concrete deck and installation of new supporting H-piles were carried out. Additionally as part of that work, a galvanic cathodic protection system was installed on Main Cells Nos. 1 – 11. The repairs to the Closure Arcs included removal of the upper portion of the circular Closer Arc piles and the associated fill above ~El. +2 - 3 ft. A new straight sheet pile closure wall was driven into the closure arc backfill between the Main Cells to fill the gap left by the partial closure arc removal. New H-piles were installed to support the modified concrete deck above. These piles were also driven through the backfill near the outer radius of the Closure Arcs. Sacrificial anodes were installed on upper repair section of the closure arcs. No anodes were installed on the H piles.

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A re-inspection of the structure was carried out in 2010. Since then sink holes have developed periodically along the length of the structure. The current investigation was carried out to investigate the cause of the settlement and to evaluate the overall condition of the structure.

SCOPE OF INVESTIGATION

This inspection covered the portion of the Lutak dock owned by the Borough of Haines. The steel sheet piling within the eleven Main Cells and the 10 Closure Arcs were subjected to Level I, II and III inspection techniques. Level I visual inspection was carried out from the top of the piles to the mudline to identify gross defects such as: visible corrosive section loss resulting in perforations; separation of the interlocks between the individual sheet piles; any mechanical impact or other damage that may have caused breeches in the wall, as well as any accumulation of fill material on the mudline that may have been hydraulically transported from behind the wall resulting in void spaces or sink holes.

Additionally, several locations were selected for Level II cleaning, detailed investigation and Level III thickness readings. These piles were selected as representative of the submerged conditions of the main cells and closure arcs. For comparative purposes one of the test site locations was included in the previous 2002 inspection. The other two sites were selected after consulting with the PND representative(s) and were based on a review of the Level I findings. Level III ultrasonic thickness testing was conducted at representative elevations both above and below water at each site. The UT readings were taken in the upper splash zone, the intertidal zone, at the mudline and at a location in between within the submerged zone.

The inspection also included evaluation of the cathodic protection system which consists of sacrificial anodes. The anodes were evaluated relative to the percentage of their volume remaining. Additionally, a corrosion potential survey was conducted on each of the Main Cells and Closure Arcs to measure the level of cathodic protection afforded each structure. The survey was conducted during periods of higher tides so as to evaluate the level of protection along the entire length of the pile from the intertidal zone to the mudline.

Representative above water and underwater photographs were also taken to document deficiencies and/or typical conditions found.

INSPECTION METHODOLOGY

Level I visual inspection of the structure was carried out during a period of predicted low tide. These lower tides provided above water access for the inspection personnel to view the structure close at hand from an inspection skiff. The underwater portion of the structure was also inspected, including the submerged portion of the Main Cells and Closure Arcs from ~El. 0 ft (MLLW) to the mudline. Deficiencies identified during the low tide inspection of the intertidal and upper portion of the structures were photo documented. Underwater photos of some of the deficiencies and typical conditions associated with the submerged portion of the structure were also obtained.

Due to the dense marine growth (primarily blue muscles and sea urchins) and the silty glacial sediments that were contained within the marine fouling, Level II cleaning of the piling was carried out prior to the actual inspection. During the cleaning operations, the underwater visibility reduced to near 0 ft. as the glacial sediments contained within the animals and/or their attachment matrix was released into the surrounding water. As shown by the accompanying photographs, cleaning prior to inspection allowed for much greater visibility of the cleaned piling.

The surface condition at each of the test sites selected for Level III testing varied. Some locations were smooth enough after scrapping and wire brushing to achieve coupling of the ultrasonic transducer. However, on the majority of the test sites extensive scale and pitting was found that required further surface preparation in order to obtain surfaces smooth enough to facilitate ultrasonic readings. This preparation was accomplished using a pneumatic grinder to remove surface irregularities such that consistent and repeatable thickness measurements could be obtained both above and below water. Thickness readings were obtained using a Cygnus Ultrasonic Thickness gauge. In addition to the steel thickness measurements, localized pit depth measurements at several sites were also obtained utilizing a Thorpe Pit Depth Gauge.

The corrosion potential survey was carried out using a Copper Copper Sulphate reference cell specifically maintained for sea water. The inspection skiff was maneuvered into the connection node between the main cell and the original circular closure arc such that the 8 o'clock position on the main cell and the 4 o'clock position of the closure arc were accessible for measurement. Electrical contact was made with the Main Cell and the Cu_2SO_4 reference cell was lowered to the mudline. Potential readings were taken at five foot intervals from the water surface to the mudline.

QUALIFICATIONS OF INSPECTORS

The investigation was conducted by a crew composed of professional and technical personnel capable and experienced in both the underwater and topside inspection and assessment of structural members. The personnel utilized on this project included the following Echelon Engineering staff:

S.D. Sommerfeld, P.E.	Project Manager/Engineer - Diver Licensed Professional Engineer - WA, Guam 29 Years Experience in Marine Structures Inspection and Design
E.B. Vegsund, B.Sc.	Marine Specialist/Biologist - Diver B.Sc. in Marine Biology - Emphasis on Marine Biological Studies 39 Years Experience in Marine Structures Inspection
S.A. Vegsund	Inspection Technician 14 Years Experience in Marine Structures Inspection
R.C. Jenson	Inspection Technician - Diver 3 Years Experience in Marine Structures Inspection

OBSERVED CONDITIONS

The field investigation was carried out during the interval of April 28 – May 2, 2014. Weather during this period was fair with minimal wind. Tidal elevations during the daylight inspection periods ranged from a low of –3.1 feet (MLLW) to a high of +17.3 feet. (MLLW). Underwater visibility ranged from near 0 ft. during the cleaning and site preparation work to approximately 10 ft. during inspection activities.

To facilitate the identification of the test site locations, the Main Cells have been numbered consecutively 1–11 from the west end. Refer to Photo No. 1. Test site locations have been referenced to the Cell number and to the elevation at which the readings were taken.

Representative photographs depicting typical conditions encountered are presented in Appendix A. A drawing presenting the identification system is presented in Appendix B. Pile thickness measurements as obtained using an Ultrasonic Thickness Gauge, are presented in Appendix C, Table 1. Table 2 of Appendix C presents the data obtained during the corrosion potential survey.

The findings of the inspection are as follows:

Main Cells

1. The overall condition of the Main Cells No. 1 -11, is fair. No evidence of perforation of the piling was noted and all of the closure knuckles connecting the individual sheets were observed to be intact with no evidence of separation.

2. A variable covering of marine fouling organisms which consisted primarily of blue muscles and small sea urchins was found to be typical on the exposed face of the piling. In some areas the fouling was so dense as to preclude visual assessment of the wall integrity. In other areas the amount of marine fouling was minimal exposing the steel piling and allowing for visual inspection of the member.

3. Throughout the inspected length of the wharf from Main Cell No. 1 – 11, generalized surface scale was evident from the intertidal zone to the mudline. Inspection did not identify any areas of accelerated, active corrosion, typically evident by a bright orange color.

4. Level II spot cleaning found the base metal to be irregular with areas of striation and pitting. Loss of section was evident and based on visual observation the loss of thickness was estimated at 1/32 – 1/8 inch. Refer to Photo No. 7.

5. A number of drilled construction holes ~3-4 inches in diameter were noted on various piles. These holes were found at various elevations along the length of the piles.

6. Inspection of the main cells found that each has been outfitted with five sets of sacrificial anodes spaced evenly around the curve of the cell and attached to the sheet piles with welded connections. Each set of anodes consists of a vertical channel with five (5) anodes spaced evenly from the intertidal zone to near the mudline. Based on the reference drawings provided, the anodes are 250 lb. stand-off anodes. Refer to Photo No's 3 and 5.

7. Inspection of the anodes found them to be in overall good condition with an estimated 75-90% of their volume remaining. Refer to Photo No. 3.

8. Level III ultrasonic thickness testing was conducted on three (3) main cells. Level II cleaning and site preparation was carried out using a combination chipping hammer, wire brushing and grinding. Areas at and near the mudline were found to have a very

dense and hard layer of scale that was very difficult to remove with hand tools. This layer has incorporated rock and other material that has become bonded into the scale.

9. All of the selected test sites were found to be in fair condition based on visual inspection. Thickness readings were obtained, with difficulty, at several sites without grinding. However, the majority of the test sites required grinding of the base metal in order to obtain a site smooth enough to obtain readings. Additionally, due to the uneven surface and possible on-going corrosion on the back side of the pile(s), the thickness of the members was noted to change considerably over a small area, (i.e. adjacent readings – refer to Table 1, Cell 10 readings at -20').

10. Thickness readings obtained on the sample piling ranged from a maximum thickness of 0.400 in. to a minimum of 0.175 inches. Analysis shows the mean of the readings to be 0.316 in. with a standard deviation of 0.075 inches. When compared to the original thickness of the piles (i.e. 0.500 in.) this indicates an average loss of ~37%.

11. Heavy pitting was found at virtually all test sites. Pit depth measurements were found to range from 0.06 in. to 0.20 inches.

Closure Arcs - Upper Repaired Section

1. The overall condition of the steel sheet piling which comprise the upper repaired portion, (i.e. straight portion) of the closure arcs No. 1.5 – 10.5, is good. The protective galvanized coating on these piles was found to be primarily intact in the intertidal zone with no evidence of any surface corrosion or scale noted. Evidence of failed coating, and minor surface corrosion was visible in the splash zone of these piles. And in several cases moderate to heavy scale was visible at the tops of these piling.

2. A variable covering of marine fouling organisms which consisted primarily of blue muscles was found to be typical of the exposed lower portions of the piling locate in the intertidal zone.

3. Inspection of these sections of the closure arcs found them to have been outfitted with two sacrificial anodes spaced evenly along the wall and attached to the sheet piles with welded connections. Based on the reference drawings provided, the anodes are 250 lb. stand-off anodes and are located in the lower intertidal zone.

4. Inspection of the anodes found them to be in overall good condition with an estimated 75-90% of their volume remaining.

5. Investigation of these upper repaired portions noted that they are not all sealed against the main cells. At five locations there is a visible gap between the end of the wall and the Main Cell. The gaps range from ~2 – 8 inches in width. Inspection of the gaps identified remnants of geotextile fabric in some areas, but no areas of intact fabric. Additionally, the backfill material that was visible consisted of large diameter rock with no evidence of any fines. The gap locations are as follows;

   - Closure Arc 4.5, East End — Refer to Photo No. 32
   - Closure Arc 6.5, West End — Refer to Photo No. 33
   - Closure Arc 8.5, East End — Refer to Photo No's 31 & 34
   - Closure Arc 9.5, East End — Refer to Photo No. 35
   - Closure Arc 10.5, West End — Refer to Photo No. 36

6. Inspection of the toe along these straight portions of wall did not identify any areas of apparent migration of backfill. No mounds or voids were identified along the length of any of the repaired sections of the closure arcs that might indicate loss or migration of backfill.

Closure Arcs - Lower Original Section

1. The overall condition of the lower original circular closure arcs is poor. Numerous perforations of the piling were identified in the lower intertidal zone from the current top of these structures (~El. +2/3') to the submerged zone at ~El. -5'. All of the perforations were found along the web of the piles. No damage or separation of the closure knuckles connecting the individual sheets was observed.

2. As was found on the Main Cells, a variable covering of marine fouling organisms which consisted primarily of blue muscles and small sea urchins was found to be typical on the exposed face of the piling. In some areas the fouling was so dense as to preclude visual assessment of the wall integrity. In other areas the amount of marine fouling was minimal exposing the steel piling and allowing for visual inspection of the member. Refer to Photo No's 8 and 9.

3. Throughout the inspected length of the wharf from Closure Arcs No. 1.5 – 10.5, generalized surface scale was visible from the intertidal zone to the mudline. Inspection did not identify any areas of accelerated, active corrosion, typically evident by a bright orange color.

4. Inspection of Closure Arc No. 7.5 found that it has failed with at least one of the sheet piles noted to have ripped from the top, full length to the mudline. Investigation of the

edges of the perforation noted evidence of both corrosive section loss, as well as plastic deformation prior to tensile failure. Refer to Photo No's 21 and 22. A number of additional perforations were noted around the perimeter of this closure arc and there is a visible lowering of the backfill immediately behind this structure. Refer to Photo No's 20, 23 and 24.

5. The Level I visual inspection also identified two closure arcs that have been punctured during the installation and driving of the newer Steel H-piling that support the renewed concrete cap / deck above. Inspection within the submerged zone found that one flange end of the H-pile cross section has perforated the eastern side of Closure Arc No. 8.5 and the western side of Closure Arc No. 10.5. Refer to Photo No. 26. Additionally, the pattern and location of the sheet pile perforations may indicate that the driving of these H-piles generated increased pressure behind the wall, increasing the stress on the sheet piles resulting in acceleration of the perforation and failure. Refer to Photo No's 27, 29 and 30.

   Further investigation of Closure Arc No. 8.5 noted partial failure and apparent lowering of the backfill, however the level of the backfill after completion of the repair work conducted in 2008 is unknown. Refer to Photo No. 27.

6. Level I inspection of the backfill behind the remaining closure arcs noted that the level of backfill was at or near the top of the piles. Additionally, inspection of the mudline found no indication of any mounds of material indicating migration of the backfill from behind the closure arcs.

7. Level II spot cleaning found the base metal to be highly irregular with areas of striation and pitting. Loss of section was evident and based on visual observation the loss of thickness was estimated at 1/32 – 1/4 inch.

8. Inspection of the closure arcs did not find any evidence of sacrificial anodes.

9. Level III ultrasonic thickness testing was conducted on three (3) closure arcs. Level II cleaning and site preparation was carried out using a combination chipping hammer, wire brushing and grinding. Areas at and near the mudline were found to have a very dense and hard layer of scale that was very difficult to remove with hand tools. This layer has incorporated rock and other material that has become bonded into the scale.

10. Based on visual observation, all of the selected test sites were in fair to poor condition with very rough, pitted and irregular surfaces. Thickness readings were obtained, with difficulty, at several sites in the intertidal zone without grinding. However, the majority of the test sites required grinding of the base metal in order to obtain a site smooth enough

to obtain readings. Additionally, due to the uneven surface and possible on-going corrosion on the back side of the pile(s), the thickness of the members was noted to change considerably over a small area, (i.e. adjacent readings – refer to Table 1, Closure Arc 9.5 readings at +3'). Refer to Photo No's 6 and 8.

11. Thickness readings obtained on the sample piling ranged from a maximum thickness of 0.370 in. to a minimum of 0.115 inches. Analysis shows the mean of the readings to be 0.231 in. with a standard deviation of 0.071 inches. When compared to the original thickness of the piles (i.e. 0.375 in.) this indicates an average loss of ~38%.

12. Heavy pitting was found at virtually all test sites. Pit depth measurements were found to range from 0.10 in. to 0.19 inches.

Continuity & Cathodic Protection Surveys

1. A Level III continuity check was conducted at three locations along the structure to check continuity between the Main Cells and the Closure Arcs. The results of the survey indicate electrical continuity between the structures. This continuity indicates that the sacrificial anodes attached to the Main Cells are providing protection for the steel piling in the lower circular closure arcs.

2. A Level III corrosion potential survey was also conducted at each Main Cell No. 1-11 and at each Lower Closure Arc No. 1.5 – 10.5. Data obtained shows protective potential values relative to a $Cu/CuSO_4$ half cell that are near the -0.850 V criteria for steel in seawater.

   Potential values for the Main Cells were found to range from a high of -1.028 V to a low of -0.858 V with an overall average of -0.912 V indicating protection of the steel members.

   Potential values for the Lower Closure Arcs were found to range from a high of -0.901 V to a low of -0.825 V with an overall average or 0.857 V indicating marginal protection of the steel members. The survey identified three specific lower closure arcs that have readings below the -0.850 V criteria. They are Closure Arc No. 5.5, 7.5 and 10.5. These cathodic protection levels <-0.850 V may not be adequate for full protection in crevice areas. Additionally, Calcium carbonate deposits are indicative of full cathodic protection in seawater and no deposits were found during this investigation.

General Observations

1. The bottom along the length of Main Cells 1 – 11 was found to slope gradually downward from ~El. –13 ft. to ~El. –22 ft. Glacial sediments were noted predominantly

from Cell No. 1 to Cell No. 9, where the composition then changed to primarily small rock (~2-4 inch diameter).

2. Cursory observation of the original steel H-piling (now derelict) located along the berth noted areas of severe corrosion and deterioration from the lower intertidal zone to the mudline. These piles were noted to have failed or to be near failure in the heavily oxygenated zone of accelerated corrosion from ~El +2 to El. -5'.

SUMMARY

In summary, this sample inspection found the overall condition of the Main Cells that comprise the Lutak Dock to be fair. The Cells are covered by dense marine fouling, but no perforations of the sheet piles were observed. Level II cleaning of representative areas to remove the fouling and expose the cells to close inspection found no perforations. General surface corrosion and thinning of the individual sheet piles has occurred. In the Level II cleaned sites generalized corrosion has occurred and the surface of the steel is very irregular. Level III ultrasonic thickness testing found the thickness to vary significantly from location to location. Thickness readings obtained on the sampled piling ranged from a maximum thickness of 0.400 inches to a minimum of 0.175 inches. Analysis shows the mean of the readings to be 0.316 in. with a standard deviation of 0.075 inches. When compared to the original thickness of the piles (i.e. 0.500 in.) this indicates an average loss of ~37%.

The Main Cells have had a galvanic cathodic protection system added since the previous inspection of 2002. Investigation of the attached CP system found it to be in fair to good condition. The sacrificial anodes retain an estimated 75-90% of their original volume and the continuity and corrosion potential surveys confirm that these anodes are providing greater than nominal protection of the steel. The average corrosion potential measurement of the Main Cells No. 1 - 11 was found to be -0.912 V.

The condition of the Closure Arcs was found to be poor. The sheet piles in the upper repaired portions, installed as part of the 2003 construction, were found to be in generally good condition. The galvanized coating on these members was found to be generally intact in the intertidal zone. However, coating deterioration, surface corrosion and heavy scale was noted at the top of a number of piles in the area where the CP system is ineffective. The intertidal zone of these piles are protected by two sacrificial anodes which were found to be in generally good condition with an estimated 75 -90% of their volume remaining. Five of these upper repaired sections were found to have voids at the end of the new vertical wall where they terminate against the main cells. Voids ranging from 2 – 8 inches were observed. Investigation of the material behind the wall identified remnants, but no intact geotextile fabric along with large rock. No evidence of fines within the backfill was evident. It is

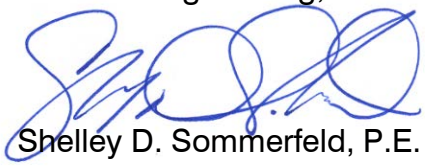
assumed that these gaps are most likely responsible for the re-occurring sink holes that develop along the dock structure.

The overall condition of the lower circular Closure Arcs was found to be poor. Numerous perforations of the piling were identified in the lower intertidal zone from the current top of these structures (~El. +2/3') to the submerged zone at ~El. -5'. All of the perforations were found along the web of the piles. The inspection also identified failure of the No. 7.5 Closure Arc, as well as two locations, at Closure Arc 8.5 on the east side and at Closure Arc 10.5 on the west side, where the newer H-piling have been driven through the original closure arc piling. The heavy marine fouling present on the structure may have provided cover preventing detection of additional damaged areas. As with the Main Cell piles, Level II cleaning of the steel found it to be very irregular and Level III testing found that the pile thickness may vary significantly from location to location. Thickness readings obtained on the sample piling ranged from a maximum thickness of 0.370 in. to a minimum of 0.115 inches. Analysis shows the mean of the readings to be 0.231 in. with a standard deviation of 0.071 inches. When compared to the original thickness of the piles (i.e. 0.375 in.) this indicates an average loss of ~38%.

There are no cathodic protection anodes attached to the lower closure arcs, however, continuity and corrosion potential surveys found that these piling are receiving nominal cathodic protection against corrosive section loss. Seven of the Closure Arcs have potentials in excess of the -0.850 V criteria for protection. Three specific Closure Arcs, No. 5.5, 7.5 and 10.5, were found to have potential readings slightly lower than the -0.850 V criteria for steel in seawater relative to a $Cu/CuSO_4$ half cell.

We sincerely appreciate the opportunity to assist you with this project. Should you have any questions regarding this report, or if we can be of further assistance, please do not hesitate to contact our office.

Yours Truly,
Echelon Engineering, Inc.



Shelley D. Sommerfeld, P.E.
President

SDS: jds
Enclosures

PHOTO No. 1: Lutak Dock, Looking Southwest - Note the arrow indicating the division between the western end owned by the Borough of Lutak and the eastern portion owned by the State. Cell 1 is located in the distance at the west end of the structure.

PHOTO No. 2: Main Cell No. 1, Looking East - Inspection noted that this portion of the cell has not been outfitted with any sacrificial anodes. The inspection did note on-going surface corrosion in this area.

PHOTO No. 3: Main Cell No. 9 - Note the two elevations of sacrificial anodes visible above water. Also note the lower original circular closure arcs and the straight repair sections of the closure arcs on each side of the main cell. The arrow indicates a derelict H-pile that has been made redundant by the maintenance repair work.

PHOTO No. 4: Closure Arc No. 1.5 Repair - Note the good condition of the new steel and the sacrificial anodes that have been estimated to retain ~75% of their original volume.

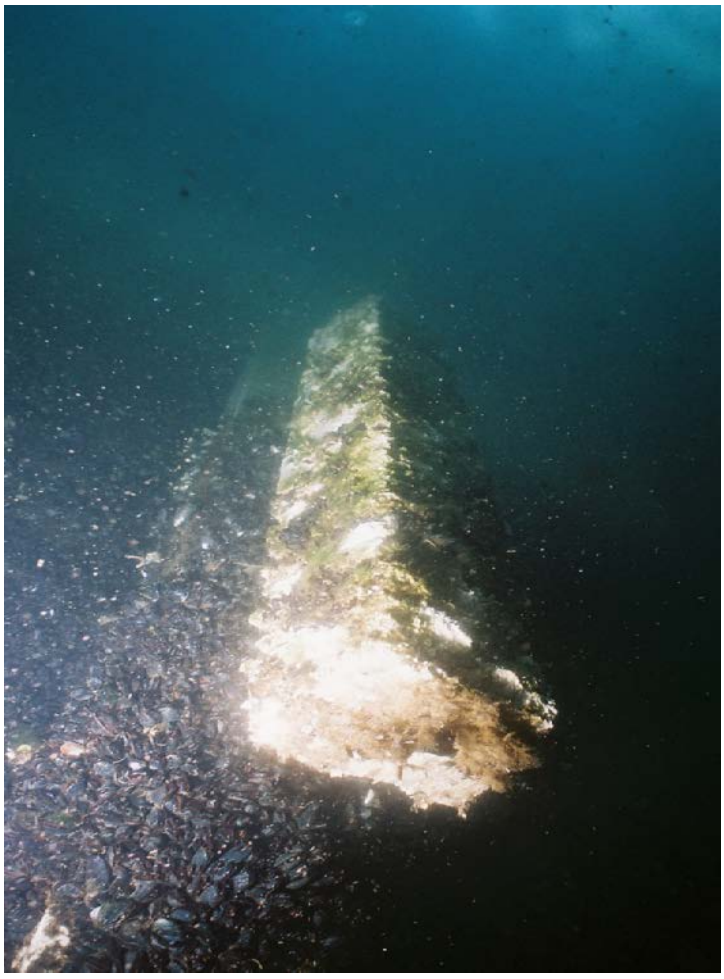


PHOTO No. 5: Main Cell No. 4, Anode - Inspection of the submerged anodes found them to retain an estimated 75-90% of their original volume.

PHOTO No. 6: Closure Arc No. 6.5, Test Site - This Level II and Level III Test site is located at ~El. +3' on the center of the cell (i.e. 6 o'clock position). Note the uneven surface of the steel in the cleaned area.

PHOTO No. 7: Main Cell No. 6, Test Site - Note the surface corrosion that is visible along the edges of the cleaned area at this El. 0' test site . The scale at this location is typical of the intertidal zone and was approximately 1/16 to 1/8 inch thick. Also note the uneven surface of the underlying cleaned steel.

PHOTO No. 8: Closure Arc 9.5, Test Site - This location within the submerged zone, near the mudline was found to be generally clear of significant scale and smooth making Level III readings easier to obtain. This condition was not typical of the conditions encountered.

PHOTO No. 9:

Closure Arc No. 1.5, West Side - Note the sheet piles which have been cleaned showing areas of perforation.

PHOTO No. 10: Closure Arc No. 1.5, East Side - Note the aluminum rod inserted into a perforation in the sheet pile. Also note the typical moderate to heavy coating of mussels that is present in the intertidal and submerged zones which hinders visible observation of defects.

PHOTO No. 11: Closure Arc No. 1.5, Looking West - Note the elevation of the backfill present behind the original closure arc cell. Investigation did not find any evidence indicating loss of fill at this location.

PHOTO No. 12: Closure Arc No. 2.5, Looking West - Investigation of this closure arc found three perforations of the sheet piling but no visible loss of backfill.

PHOTO No. 13: Closure Arc No. 3.5, Looking West - No evidence of perforation of the sheet piling or loss of backfill was found associated with this circular closure arc.

PHOTO No. 14: Closure Arc No. 4.5, Looking West - No evidence of perforation of the sheet piling or loss of backfill was found associated with this circular closure arc.

PHOTO No. 15: Closure Arc No. 5.5, West Side - Note the Level II cleaned area revealing perforation of the sheet pile.

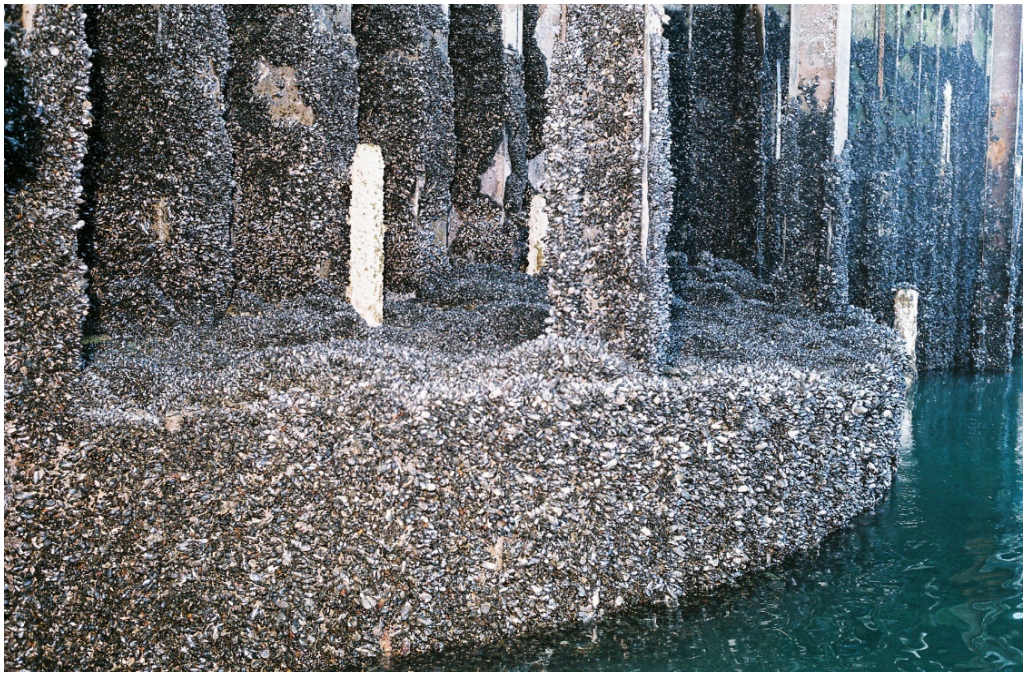


PHOTO No. 16: Closure Arc No. 5.5, East Side - No evidence of perforation was identified on the east side of this closure arc. Note the level of the back fill and the overall good condition of the anodes.

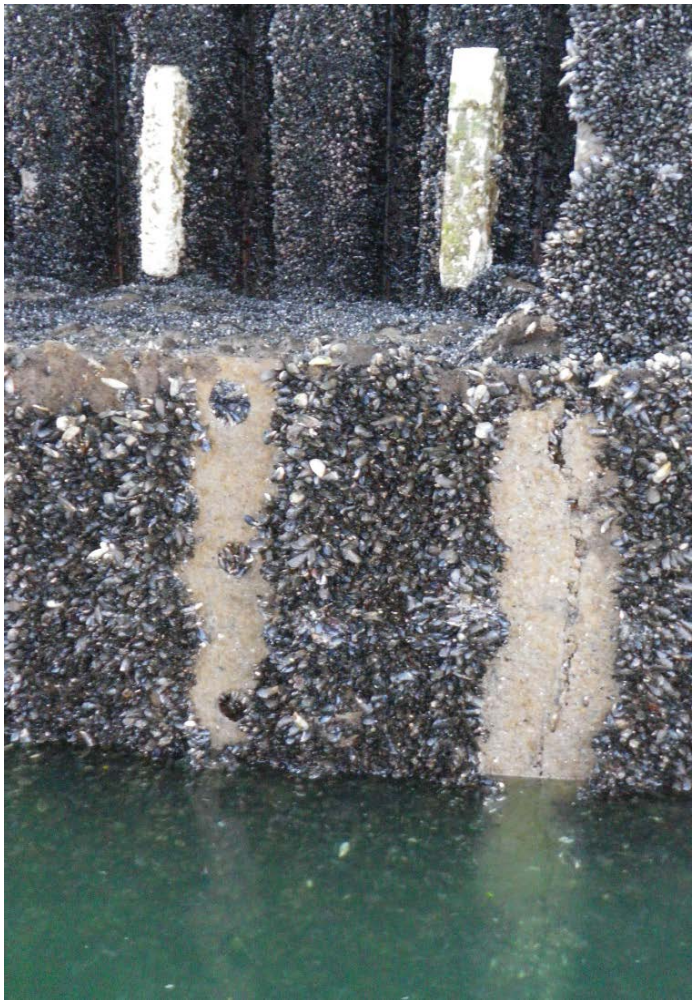


PHOTO No. 17: Closure Arc No. 6.5, West Side - Note the rip along the right sheet pile and the multiple construction / weep holes in the sheet pile on the left which have both been subjected to Level II cleaning.

PHOTO No. 18: Closure Arc No. 6.5, East Side - Inspection also found these two sheet piles which have also failed due to corrosive section loss.

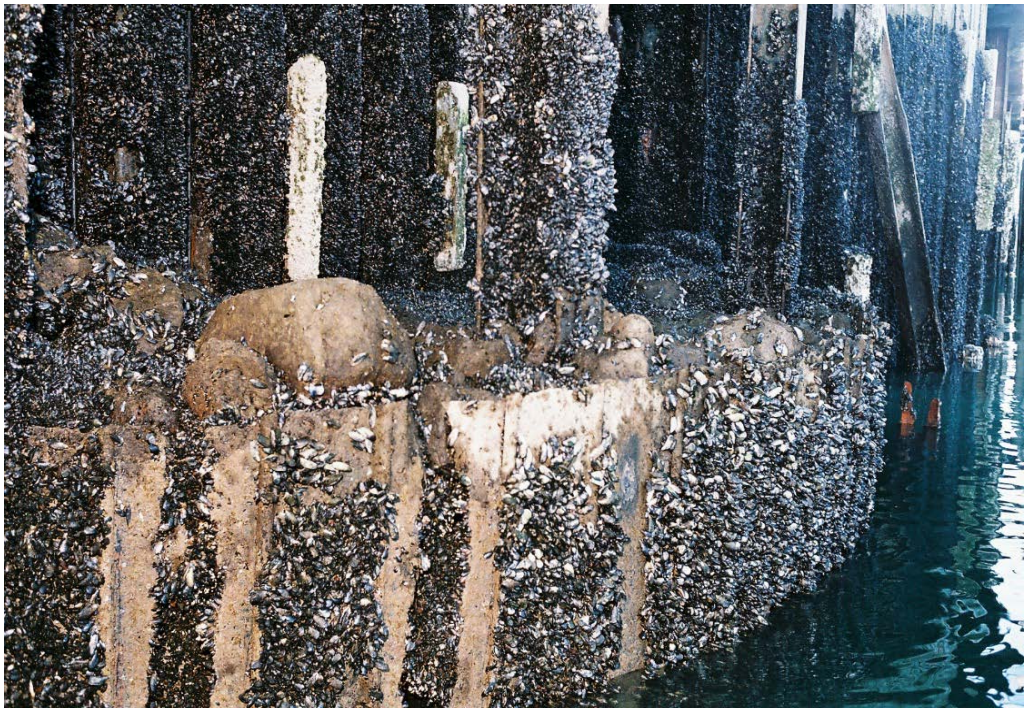


PHOTO No. 19: Closure Arc No. 6.5, Looking West - Note the backfill is level with the top of the circular closure arc. Investigation did not identify any evidence of loss of backfill at this closure arc.

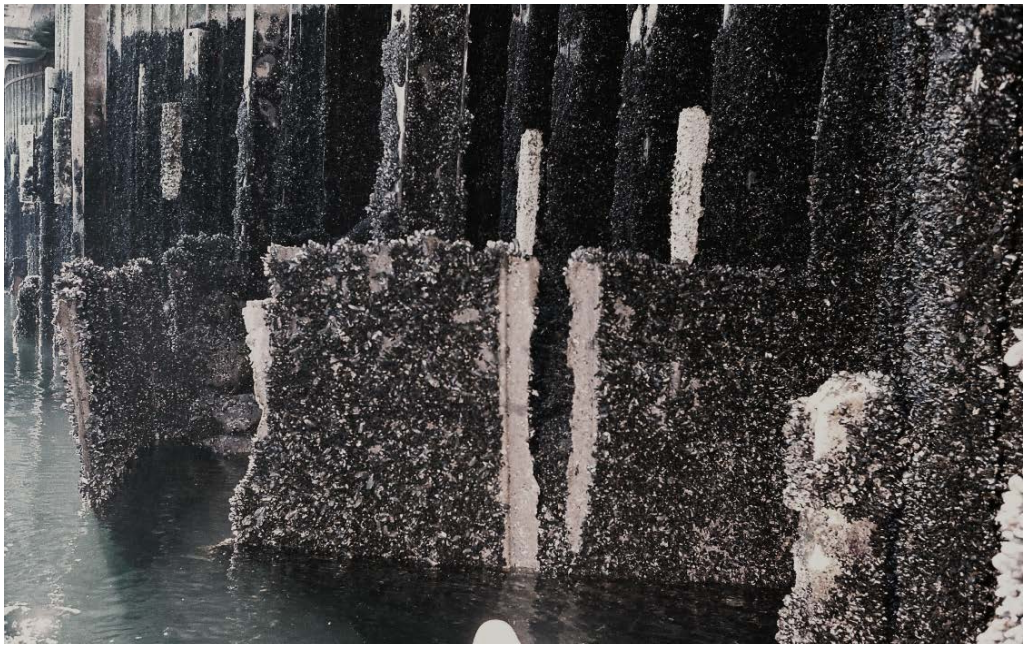


PHOTO No. 20: Closure Arc No. 7.5, West Side - Investigation found that this closure arc has failed due to corrosive section loss. Also note the loss of fill at this location. Investigation of the fill against the straight closure arc repair found no evidence of migration of the backfill from under the sheet piling.

PHOTO No. 21: Closure Arc No. 7.5, Failed Sheet Pile - Note the knife edge thinning of the failed sheet piling located on the east edge of the failure.

PHOTO No. 22: Closure Arc No. 7.5, Failed Sheet Pile - Note the, thin and uneven edge of the steel resulting from the plastic deformation and ultimate tensile failure of the pile's web. Visible corrosion and thinning were evident on the piles. Investigation of the failed piles found the tear to extend to the mudline.

PHOTO No. 23: Closure Arc No. 7.5, East Side - Piles with additional perforation and failure were also identified on this side of the closure arc.

PHOTO No. 24: Closure Arc No. 7.5, Looking West - Note the loss of backfill from behind the circular closure arc and the overall good condition of the anodes attached to the straight, repair portion of the closure arc.

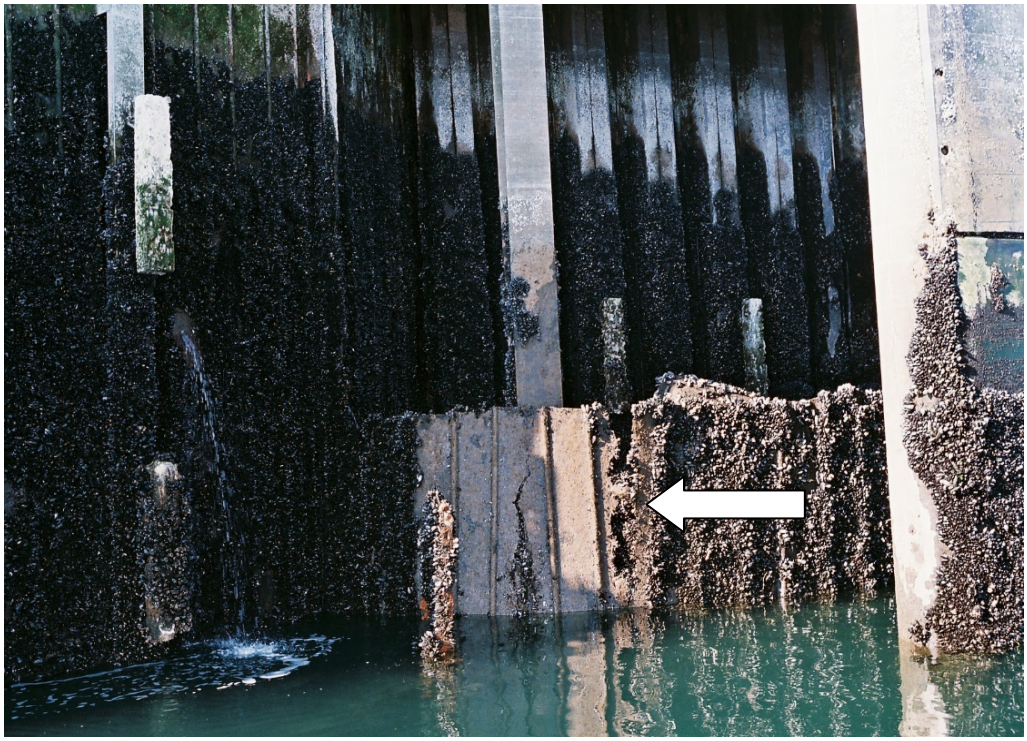


PHOTO No. 25:

Closure Arc No. 8.5, East Side - Note the Level II cleaned area in front of the H-pile exposing the perforation of the sheet pile. Also note the failure of the sheet pile to the right indicated by the arrow.

PHOTO No. 26:

Closure Arc No. 8.5, East Side - Inspection found that the H-pile that supports the concrete deck, and was installed as part of the repair work, has been driven through the original circular closure arc in the submerged zone. Note the flange of the H-pile which is visible outside of the sheet piling at this location.

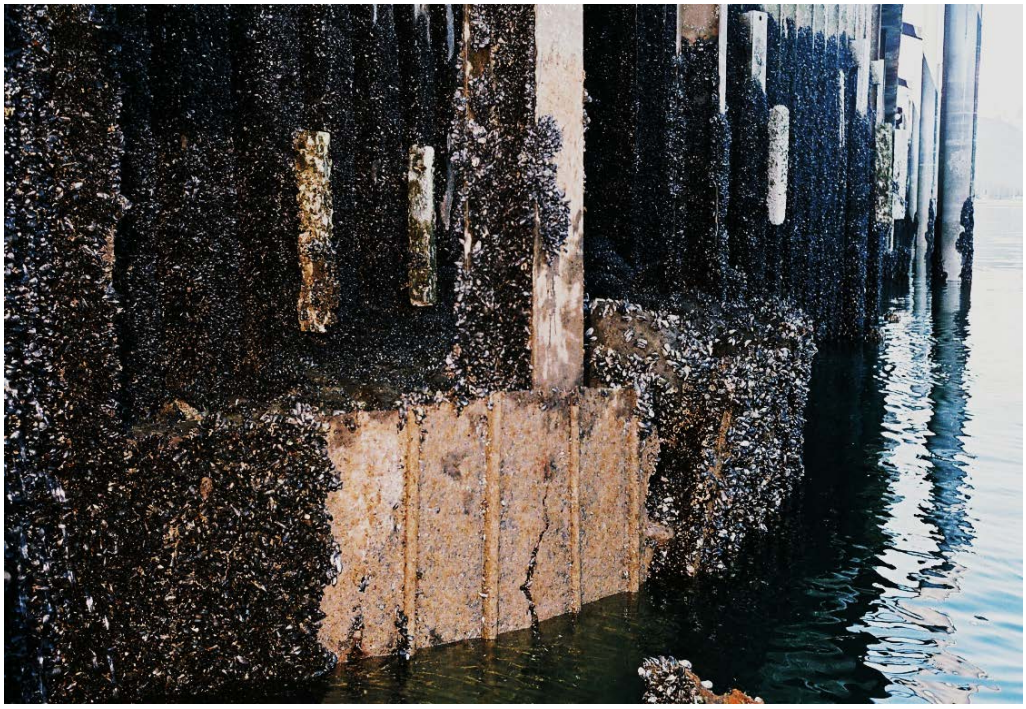


PHOTO No. 27: Closure Arc No. 8.5, Looking West - Note the level of the backfill behind the circular closure arc. No evidence of any loss of fill was found associated with this closure arc.

PHOTO No. 28: Closure Arc No. 9.5, Looking West - Inspection did not identify any perforation or significant loss of fill associated with this closure arc. Note the overall good condition of the anode attached to the straight repair portion of the closure.

PHOTO No. 29: Closure Arc No. 10.5, West Side - Note the perforation damage to the three sheet piles which have received Level II cleaning. Inspection below water found that this western H-pile has also been driven through the sheet piling in the submerged zone.

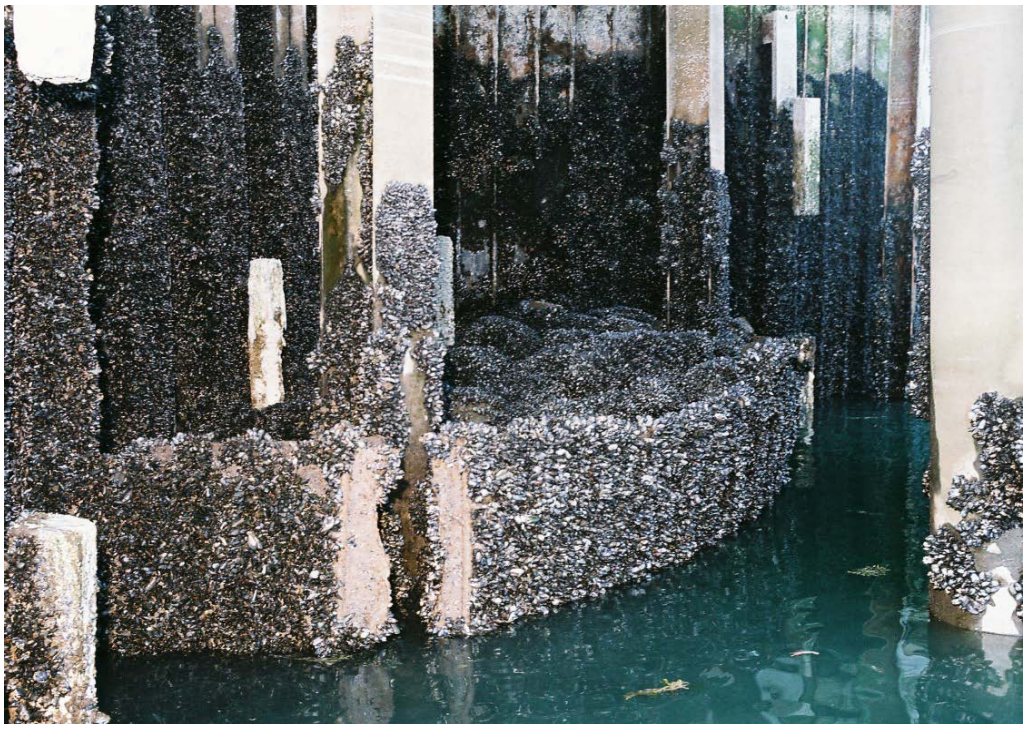


PHOTO No. 30: Closure Arc No. 10.5, East Side - Investigation of the east side of this closure arc also identified damage and failure of the sheet piling. Investigation of the back fill did note it to be slightly lower, but no visible evidence of loss was apparent.

PHOTO No. 31:

Closure Arc No. 8.5 Repair, East End - Note the repaired section of the 8.5 closure arc to the right of the stadia rod and the Main Cell No. 9 on the left. The arrows indicate the gap between the main cell and the east end of the repair section. Note a cleaned portion of the steel H-pile shown on Reference Drawing S-3, Detail 8, can be seen just above the lower right arrow. The upper right arrow indicates a large (~2' dia.) rock in the backfill. No evidence of any fines or intact geotextile fabric was visible through this gap. Remnants of the geotextile fabric was found at the bottom of the gap. This condition is typical of the locations shown in the following series of Photos No. 32-36.

PHOTO No. 32:

Closure Arc No. 4.5 Repair, East End - Note the gap between the steel H-pile, designed to terminate and seal the end of the closure repair, and the main cell. No evidence of any intact geotextile fabric or any fines was visible through the gap.

PHOTO No. 33:

Closure Arc No. 6.5 Repair, West End - Note the gap between the steel H-pile, designed to terminate and seal the end of the closure repair, and the main cell. No evidence of any intact geotextile fabric or any fines was visible through the gap.

PHOTO No. 34:

Closure Arc No. 8.5 Repair, East End - Note the gap between the steel H-pile / end sheet pile and the main cell. No evidence of any intact geotextile fabric or any fines was visible through the gap. (Also shown in Photo No. 31).

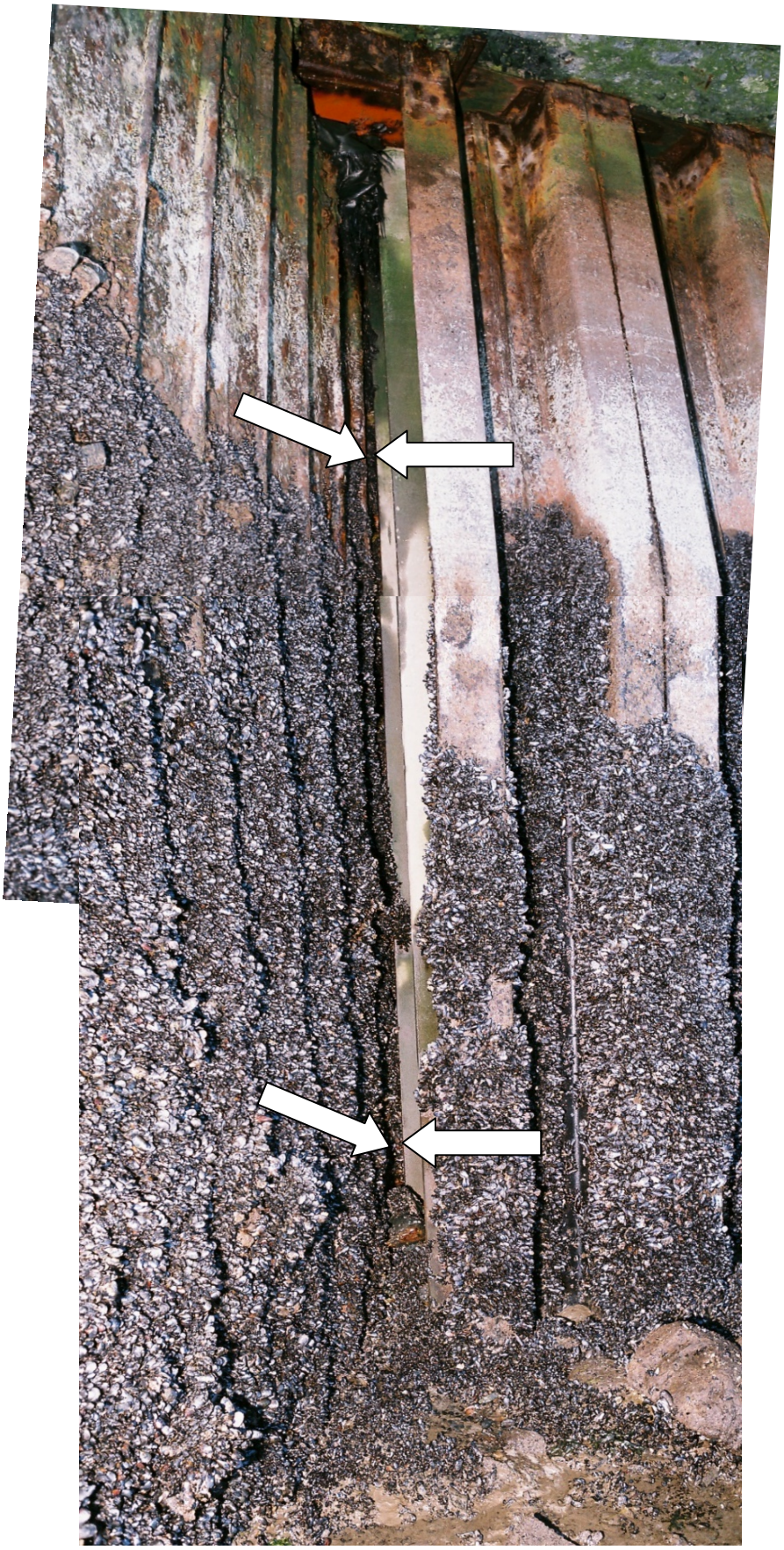


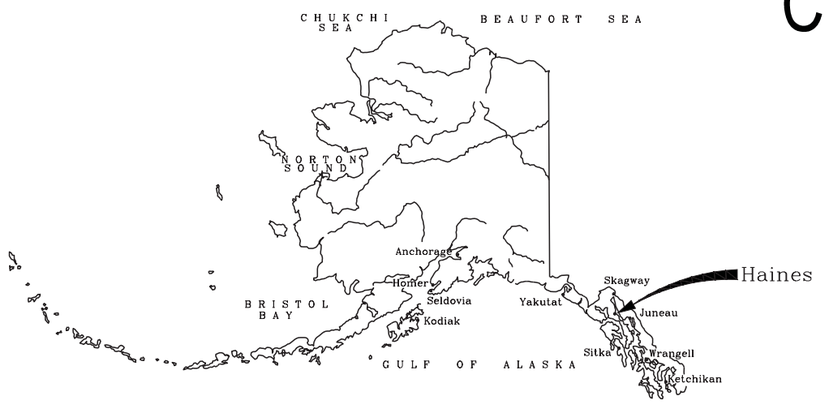
PHOTO No. 35:

Closure Arc No. 9.5 Repair, East End - Note the gap between the steel H-pile, designed to terminate and seal the end of the closure repair, and the main cell. No evidence of any intact geotextile fabric or any fines was visible through the gap.

PHOTO No. 36:

Closure Arc No. 10.5 Repair, West End - Note the gap between the last steel pile and the main cell. No evidence of any intact geotextile fabric or any fines was visible through the gap.

LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES, ALASKA
EDA PROJECT NO. 07-79-4967



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LIST OF DRAWINGS

STRUCTURAL ABBREVIATIONS

&	And	DB	Diaphragm Boundary	GA.	GA.	(N)	New	SOG	Slab-on-Grade
@	At	DBL	Double	GALV	Galvanized	NFS	Non-Frost Susceptible	SPCG	Spacing
℄	Center Line	DEMO	Demolition	GLB	Glue-Laminated Beam	NIC	Not in Contract	SPEC	Specification
		DIAG	Diagonal	GR	Grade	NO	Number	SQ	Square
AB	Anchor Bolt	DICA	Drilled-in-Concrete Anchor	GWB	Gypsum Wallboard	NOM	Nominal	SSH	Short Slotted Hole
ADJ	Adjustable, Adjacent	DIM	Dimension			NS	Near Side	STT	Stainless Steel
AGGR	Aggregate	DIMA	Drilled-in-Masonry Anchor	HD	Hold-down	NTS	Not to Scale	STD	Standard
ALT	Alternate	DL	Dead Load	HDG	Hot-Dip Galvanized			STFNR	Stiffener
ALUM	Aluminum	DN	Down	HDR	Header	OA	Overall	STL	Steel
ANCH	Anchor, Anchorage	DO	Ditto	HOR	Horizontal	OC	On Center	STOR	Storage
APPROX	Approximate	DTL	Detail	HT	Height	OD	Outside Diameter (Dim.)	STRUCT	Structural
ARCH	Architectural, Architect	DWG	Drawing	HSL	Horizontal Long Slotted Holes	OPNG	Opening	SYM	Symmetrical
ASTM	American Society for Testing and Materials					OPP	Opposite		
		(E)	Existing	ID	Inside Diameter	OSB	Oriented Strand Board	T	Top
AWW	All Weather Wood	EA	Each	IN OR "	Inch			TEMP	Temporary
		EC	Epoxy Coat	INCL	Include	P	Plate	T&B	Top & Bottom
BLDG	Building	EF	Each Face	INSUL	Insulation	PAR	Parallel	T&G	Tongue & Groove
BLK	Block	EJ	Expansion Joint	INT	Interior	PC	Pre-Cast	THK or t	Thick
BLKG	Blocking	ELEC	Electrical	INTMD	Intermediate.	PERIM	Perimeter	THRU	Through
BM	Beam	ELEV	Elevation			PLF	Pounds Per Linear Feet	TO	Top of
BOT	Bottom	ENG	Engineer	JST	Joist	PLYWD	Plywood	TOB	Top of Beam
BO	Bottom of	EQ	Equal, Earthquake	JT	Joint	PMJ	Pre-molded Joint	TOC	Top Of Concrete
BRG	Bearing	EQUIP	Equipment			PSF	Pounds Per Square Foot	TOS	Top of Steel
BSMT	Basement	EXP	Expansion	K	Long, Length, Angle	PSI	Pounds Per Square Inch	TOW	Top of Wall
BTWN	Between	EXST	Existing	KSI	Development Length	PT	Point	TRANS	Transverse
		EXT	Exterior			PT	Pressure - Treated	TS	Tube Steel
C	Channel Section	EW	Each Way	L	Long, Length, Angle			TYP	Typical
CIP	Cast-in-Place			LKD	Development Length	QTY	Quantity		
CJ	Control Joint	FB	Flat Bar	LLH	Long Leg Horizontal			UBC	Uniform Building Code
CLG	Ceiling	FD	Floor Drain	LLV	Long Leg Vertical	R	Radius, Reaction	UNO	Unless Noted Otherwise
CLR	Clear	FDN	Foundation	LOC	Location	REF	Reference, Refer		
CMU	Concrete Masonry Unit	FF	Finished Floor	LONG	Longitudinal	REINF	Reinforced	VER	Verify
COL	Column	FIN	Finish			REQ'D	Required	VERT	Vertical
CON JT	Construction Joint	FLR	Floor	MATL	Material	REV	Revision	VEST	Vestibule
CONC	Concrete	FO	Face of	MAX	Maximum	RMV	Remove	VSL	Vertical Slotted Hole
CONN	Connection	FOBM	Face of Beam	MC	Moment Connection/Misc. Channel	RM	Room		
CONSTR	Construction	FOC	Face of Concrete	MECH	Mechanical	RO	Rough Opening	WH	Weep Hole
CONT	Continuous	FOS	Face of Steel	MEMB	Membrane			WHS	Welded Headed Stud
CONTR	Contractor	FRMG	Framing	MFR	Manufacturer	SCHED	Schedule	W/	With
COORD	Coordinate	FS	Far Side	MID	Middle	SECT	Section	W/O	Without
CP	Complete Penetration	FT	Foot or Feet	MIN	Minimum	SH ℄	SHEAR PLATE		Wide flange, Wide, Width
CTJ	Control Joint, Contraction Joint	FTG	Footing	MISC	Miscellaneous	SHT	Sheet	WD	Wood
CTR	Center	FV	Field Verify	MTD	Mounted	SIM	Similar	WP	Work Point, Water Proofing
CTSK	Countersunk			MTL	Metal	SL	Snow Load, Slope	WWF	Welded Wire Fabric

NOV 2003
RECORD DRAWINGS

THIS RECORD DRAWING INFORMATION WAS PROVIDED BY THE CONTRACTOR. REID MIDDLETON HAS NOT REVIEWED THE RECORD DRAWINGS INFORMATION AND SO IS NOT RESPONSIBLE FOR ITS ACCURACY.

NO.	DATE	BY	REVISION

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LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES - EDA PROJECT NO. 07-79-04967

COVER SHEET

DWG	
DES.	SHEET NO. G1
DR.	
CH.	
F.B.	OF 16 SHEETS
DATE	
JOB NO.	40-02-010

GENERAL NOTES

GENERAL

THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS AMONG THE DRAWINGS BEFORE STARTING ANY WORK OR FABRICATION. ANY DISCREPANCIES FOUND AMONG THE DRAWINGS, SITE CONDITIONS, SPECIFICATIONS, AND THESE NOTES SHALL BE REPORTED TO THE OWNER'S REPRESENTATIVE.

ALL CONSTRUCTION SHALL COMPLY WITH THE STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES STANDARD SPECIFICATIONS.

SAFETY – THE CONTRACTOR IS RESPONSIBLE FOR MEETING ALL O.S.H.A. SAFETY STANDARDS. THE CONTRACTOR IS IN CHARGE OF ALL SAFETY MATTERS ON AND AROUND THE JOB SITE.

DEMOLITION

CONTRACTOR SHALL SUBMIT A DEMOLITION PLAN PRIOR TO BEGINNING WORK. PLAN SHALL CLEARLY DESCRIBE MEANS AND METHODS OF DEMOLITION AND IDENTIFY TO WHERE THE MATERIALS ARE TO BE TRANSPORTED AND BY WHAT MEANS.

THE EXISTING TIMBER FENDERS TO BE DEMOLISHED SHALL BE DISPOSED OF AT A LANDFILL AUTHORIZED TO RECEIVED CREOSOTE TREATED MATERIAL OR SHALL BE SALVAGED FOR REUSE BY THE CONTRACTOR. ALL OF THE TIMBER AND TIMBER PILES OF THE FENDERING SYSTEM ARE BELIEVED TO BE CREOSOTE TREATED.

THE NEW H-PILES, SHEET PILES AND CAP BEAM MODIFICATIONS SHALL BE COMPLETE BEFORE REMOVAL OF THE UPPER SECTION OF THE (E) CLOSURE ARCS AND THE FILL BEHIND THEM.

METHOD OF REMOVAL OF THE FILL BEHIND THE DEMOLISHED PORTION OF THE CLOSURE ARCS SHALL BE SUCH THAT THE CONDITIONS OF THE US ARMY CORPS OF ENGINEERS PERMIT FOR THIS PROJECT ARE NOT VIOLATED.

STRUCTURE DESIGN DATA

STRUCTURE MODIFICATIONS HAVE BEEN DESIGNED FOR THE FOLLOWING OPERATIONAL LOADS ON THE COMPLETED STRUCTURES. ADEQUACY OF EXISTING STRUCTURES TO SUPPORT THESE LOADS HAS NOT BEEN VERIFIED.

LIVE LOADS:

RO-RO BRIDGE MODIFICATIONS:	130 KIP AXLE WEIGHT
CLOSURE ARC MODIFICATIONS:	1000PSF UNIFORM LOAD OR CRANE TRACK PRESSURE OF 3500 PSF OVER AREA 4'X23'
FENDER SYSTEM:	VESSEL IMPACT ENERGY OF 230,000 FT – LBS @ 0 DEGREES

SPECIAL INSPECTION

THE FOLLOWING WORK SHALL BE INSPECTED BY A SPECIAL INSPECTOR:

1. CONCRETE. DURING THE TAKING OF TEST SPECIMENS AND PLACING OF REINFORCED CONCRETE.
2. BOLTS INSTALLED IN CONCRETE. PRIOR TO AND DURING THE PLACEMENT OF CONCRETE AROUND BOLTS.
3. REINFORCING STEEL. DURING PLACING OF REINFORCING STEEL. THE SPECIAL INSPECTOR NEED NOT BE PRESENT CONTINUOUSLY DURING PLACING OF REINFORCING STEEL PROVIDED THE SPECIAL INSPECTOR HAS INSPECTED FOR CONFORMANCE TO THE APPROVED PLANS PRIOR TO THE CLOSING OF FORMS OR THE DELIVERY OF CONCRETE TO THE JOBSITE.
4. STRUCTURAL WELDING. DURING THE WELDING OF ANY MEMBER, EXCEPT FOR WELDING DONE IN AN AISC APPROVED FABRICATOR'S SHOP. THE SPECIAL INSPECTOR NEED NOT BE CONTINUOUSLY PRESENT DURING WELDING OF SINGLE-PASS FILLET WELDS NOT EXCEEDING 5/16 INCH (7.9 MM) IN SIZE, PROVIDED THE MATERIALS, QUALIFICATIONS OF WELDING PROCEDURES AND WELDERS ARE VERIFIED PRIOR TO THE START OF WORK; PERIODIC INSPECTIONS ARE MADE OF WORK IN PROGRESS; AND A VISUAL INSPECTION OF ALL WELDS IS MADE PRIOR TO COMPLETION OR PRIOR TO SHIPMENT OF SHOP WELDING:
5. PILES. DURING DRIVING OF PILES

FOUNDATION NOTES

ALLOWABLE SOIL BEARING PRESSURE:	3000 PSF
CAP SUPPORT H-PILE CAPACITY REQ'D:	400 KIPS

REFER TO SOILS REPORT FOR PILE INSTALLATION, SUB-GRADE PREPARATION, AND LATERAL EARTH PRESSURES.

STRUCTURAL CONCRETE NOTES

ALL CONCRETE SHALL HAVE A WATER REDUCING ADMIXTURE MEETING ASTM C 494, TYPE A (TYPE E FOR COLD WEATHER CONCRETING) AND NOT MORE THAN 0.1 PERCENT CHLORIDE IONS. MAXIMUM WATER/CEMENT RATIO SHALL BE 0.40. MAXIMUM SLUMP BEFORE ADDING THE RANGE WATER REDUCING ADMIXTURE SHALL BE THREE INCHES. MAXIMUM AGGREGATE SIZE SHALL BE ¾". COLD WEATHER CONCRETING SHALL CONFORM TO ACI SPECIFICATION 306.1 AND ACI 306R. CALCIUM CHLORIDE SHALL NOT BE USED. MINIMUM CEMENT CONTENT SHALL BE 5-½ SACKS.

CAST-IN-PLACE CONCRETE:	f'c = 4,000 PSI.
AIR ENTRAINING ADMIXTURE:	ASTM C260
AGGREGATE:	ASTM C33
EPOXY ADHESIVE:	ASTM C881
REINFORCING BARS:	ASTM A 615, GRADE 60.
WATER:	ASTM C94, SECTION 4.1.3
CEMENT:	ASTM C150

THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT FOR CAST-IN-PLACE CONCRETE:

A. CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	3 INCHES
B. ALL OTHER CONCRETE	2 INCHES

ALL WELDED WIRE FABRIC (WWF): ASTM A 185 OR ASTM A 497. CONTRACTOR SHALL TAKE SPECIAL CARE TO MAKE SURE WWF IN SLABS-ON-GRADE IS SUPPORTED IN ITS PROPER LOCATION.

WHERE REQUIRED, DOWELS SHALL MATCH SIZE AND QUANTITY OF MAIN REINFORCING.

NO WELDING OF REBAR IS ALLOWED WITHOUT ENGINEER'S APPROVAL.

DRILLED IN ADHESIVE ANCHORING

DRILLED IN ADHESIVE ANCHORING FOR BOTH ANCHOR BOLTS AND REBAR SHALL BE DONE WITH HILTI HVA 2421 EPOXY ADHESIVE OR AN APPROVED EQUAL. UNLESS OTHERWISE NOTED MINIMUM EMBEDMENT INTO CONCRETE SHALL BE 8 DIAMETERS. ALL INSTALLATION SHALL CONFORM TO THE MANUFACTURER'S INSTRUCTIONS.

STRUCTURAL STEEL NOTES

STRUCTURAL STEEL:	ASTM A 36, UNLESS OTHERWISE NOTED.
STRUCTURAL STEEL TUBES (HSS):	ASTM A 500, GRADE B.
STRUCTURAL STEEL PIPES:	ASTM A 53, GRADE B.
BOLTS:	ASTM A 325 EXCEPT WHERE NOTED A307
HARDENED WASHERS:	ASTM F 436
NUTS:	AS RECOMMENDED BY ASTM IN THE BOLT SPECIFICATION
WELDED HEADED STUDS:	ASTM A 108
THREADED RODS:	ASTM A 36 OR A307
NON-SHRINK GROUT:	ASTM C 1107
WELDING ELECTRODES :	E70, LOW-HYDROGEN

GALVANIZING: ALL STEEL FABRICATION AND PILING (EXCEPT SHEET PILES) SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A 123, UNLESS OTHERWISE NOTED.

STEEL SHEET PILES

SHEET PILES SHALL BE "Z" – SHAPED, SHALL HAVE A 50 KSI MINIMUM YIELD STRENGTH, AND SHALL, AS A MINIMUM, HAVE THE FOLLOWING SECTION PROPERTIES PER LINEAL FOOT OF WALL:

AREA IN^2	SECTION MODULUS IN^3	MOMENT OF INERTIA IN^4	WEIGHT PSF
11.2	46.8	281	38

NOV 2003
RECORD DRAWINGS
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NO.	DATE	BY	REVISION

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LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES – EDA PROJECT NO. 07-79-04967

GENERAL NOTES

DWG

DES.	SHEET NO.
DR.	G2
CH.	
F.B.	OF 16 SHEETS

DATE

JOB NO. 40-02-010

NOTES:

1. THE CONTRACTOR MUST COMPLETE REPAIR OF CLOSURE ARCS 6-10 AND INSTALL THE 5 NEW FENDER UNITS BEFORE PERFORMING REPAIRS ON CLOSURE ARCS 1-5.

2. WHILE WORK IS PROCEEDING ON REPAIR OF CLOSURE ARCS 1-5 BARGE CARGO ACTIVITIES WILL BE RESTRICTED TO THE EAST WORK AREA. WHILE WORK IS PROCEEDING ON REPAIR OF CLOSURE ARCS 6-10 BARGE CARGO ACTIVITIES WILL BE RESTRICTED TO THE THE WEST WORK AREA.

3. RESURFACING WORK CAN PROCEED CONCURRENTLY WITH THE DOCKSIDE REPAIRS BUT MUST FOLLOW THE SAME SEQUENCE AS THE CLOSURE ARCS, THAT IS DO THE WORK EAST OF THE FUEL HEADER FIRST AND WHEN THAT IS COMPLETE DO WORK WEST OF THE HEADER.

4. DREDGING AND FENDER DEMOLITION MAY PROCEED CONCURRENTLY WITH THE OTHER OPERATIONS. HOWEVER, THE WORK MUST ACCOMMODATE ARRIVAL AND OFF-LOADING OF SCHEDULED VESSEL TRAFFIC.

5. CONTAINERS AND OTHER EQUIPMENT RELATED TO CARGO ACTIVITIES MUST BE STORED OUTSIDE THE CONTRACTOR'S ACTIVE WORK AREAS.

6. THE CONTRACTOR SHALL PROVIDE THE CITY WITH A SCHEDULE SHOWING THE TIMES HE WILL BE OPERATING IN THE VARIOUS WORK AREAS AND NOTIFY THE CITY IMMEDIATELY OF ANY CHANGES IN THE SCHEDULE BUT NOT LESS THAN 72 HOURS FROM THE POSTED SCHEDULE.

7. THE CONTRACTOR STAGING AREA IS FOR THE EXCLUSIVE USE OF THE CONTRACTOR THROUGHOUT THE CONSTRUCTION PERIOD.

8. CONTRACTOR WILL ARRANGE AND PAY FOR TEMPORARY POWER AND PHONE THROUGH ALASKA POWER AND TELEPHONE.

9. NON-POTABLE WATER IS AVAILABLE FOR THE CONTRACTORS USE DURING CONSTRUCTION WHERE SHOWN.

LUTAK INLET

TUG

150'x60' FUEL BARGE

ELECTRICAL BOX AND WATER SPIGOT

EXISTING CONCRETE CAP ELEVATION 28.98'

BARGE RAMP

BOAT RAMP

CONTRACTOR SHALL FIELD LOCATE AND PROTECT EXISTING FACILITIES

WATER BOX

NON-POTABLE WATER FOR CONSTRUCTION

POWER POLE

DOCK OFFICE

TRACT A

FR. Lot 5 City of Haines

WEST WORK AREA

COMMON AREA

ACCESS ROAD

15 FT ACCESS FOR USE BY DELTA WESTERN FUEL TRUCKS DURING CONSTRUCTION

EAST WORK AREA

STAGING AREA

CONTRACTOR STAGING AREA

TRACT D

TRACT C

TRACT B

TRACT E

40' R

POINT 102

EXISTING 10' CHAIN LINK FENCE

EXISTING 6' CHAIN LINK FENCE

ACCESS ROAD

20' R

LUTAK ROAD

ATS 1464

POINT 101

SW 1/4, NE 1/4, SW 1/4, SW 1/4
City of Haines

FR. Lot 6
City of Haines

FR. Lot 6
City of Haines

FR. Lot 7
State of Alaska

FR. Lot 8
State of Alaska

SECTION 10
T 30 S, R 59 E
C. R. M.

0 20 40 80

NORTH

NOV 2003 RECORD DRAWINGS

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NO.	DATE	BY	REVISION

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LUTAK DOCK REHABILITATION
CITY OF HAINES - EDA PROJECT NO. 07-79-04967

CONTRACTOR WORK AND STAGING AREAS

DWG	
DES.	SHEET NO. G3
DR.	
CH.	
F.B.	of 16 SHEETS
DATE	
JOB NO.	695600

CONTROL NETWORK, TOPO AND BATHYMETRIC DATA WAS COLLECTED
February 19 – 22, 2002.
VERTICAL CONTROL LOOPS; February 19, 2002

LEGEND

- EXISTING MOORING BIT OR BOLLARD
- 3.25" ALUMINUM CAP
- SOIL TEST HOLE
- CONTOUR
- EXISTING CHAIN LINK FENCE
- WATER LINE
- UNDERGROUND ELECTRIC LINES
- UNDERGROUND FUEL LINES
- ATS 1464 TRACT A PROPERTY LINE
- ADJUSTED ATS 1464 PROPERTY LINES

LUTAK INLET

N

ELECTRICAL BOX AND WATER SPIGOT
EXISTING CONCRETE CAP ELEVATION 28.98'
EXISTING CONCRETE PAD
BARGE RAMP
UGE
W
BOAT RAMP
CONTRACTOR SHALL FIELD LOCATE AND PROTECT EXISTING FACILITIES
TRACT A
WATER BOX
POWER POLE
DOCK OFFICE
EXISTING CONCRETE CAP ELEVATION 26.44'
APROXIMATE LOCATION EXISTING FUEL LINES 4.5'± BURY AT THIS END VERIFY LOCATION AND DEPTH
EXISTING CONCRETE PAD TO BE REMOVED. FIELD VERIFY LOCATION
F
FR. Lot 5 City of Haines
ACCESS ROAD
LUTAK DOCK PIER HEAD
EXISTING CONCRETE CAP ELEVATION 28.49'
TRACT D
POINT 102
EXISTING 10' CHAIN LINK FENCE
EXISTING 6' CHAIN LINK FENCE
LUTAK ROAD
TRACT B
TRACT C
SW 1/4, NE 1/4, SW 1/4, SW 1/4
City of Haines
APROXIMATE EXISTING EDGE OF PAVEMENT
FR. Lot 6 City of Haines
ATS 1464
POINT 101
TRACT E
FR. Lot 6 City of Haines
FR. Lot 7 State of Alaska
FR. Lot 8 State of Alaska
Section 10
T 30 S, R 59 E, C.R.M.

HORIZONTAL CONTROL:

Basis of Coordinates is
HNS–5 (SE AKDOT&PF) = USKH Control Point 101
see survey control table

The Basis of Bearing for this survey was record information per the Alaska Tideland Survey (ATS) No. 1464. from corner 1 (USKH 101) to corner 2 (USKH 102) of tract b, ats 1464, which bears N 62°09'48" W.
see survey control table

VERTICAL CONTROL:

Datum is MLLW based on static gps ties to NOAA benchmarks 2434 A & B located in Tiayasanka Harbor. Static gps performed on 9/9/2001 and processed with geoid '99 for orthometric heights.

These benches are on the 1960–1978 tidal epoch, but elevations are computed based on the last five years tidal data to more closely relate to current sea level conditions. NOAA Benches set in 1998. Static ties refer to point #19, also known as HNS–5. Point#19 is a 3 1/4" AL Cap for ATS–1464 located in a Centerline style Monument case in the toe of curb of the median running through ferry terminal parking lot. MLLW elevation derived for point# 101 (19 DOT survey) is 33.99'.

SURVEY CONTROL TABLE

NOTE: COORDINATE VALUES ONLY FOR THIS SURVEY CONTROL NETWORK

POINT NO.	LOCATION	DESCRIPTION	NORTHING	EASTING	ELEV.
101	FERRY TERMINAL PARKING LOT	3–1/4" ALCAP (HNS–5)	10000.00	10000.00	33.99'
102	FERRY TERMINAL PARKING LOT	3–1/4" ALCAP	10181.19	9656.87	

GRAPHIC SCALE
40 0 20 40 80 160
1" = 40'

NOV 2003
RECORD DRAWINGS
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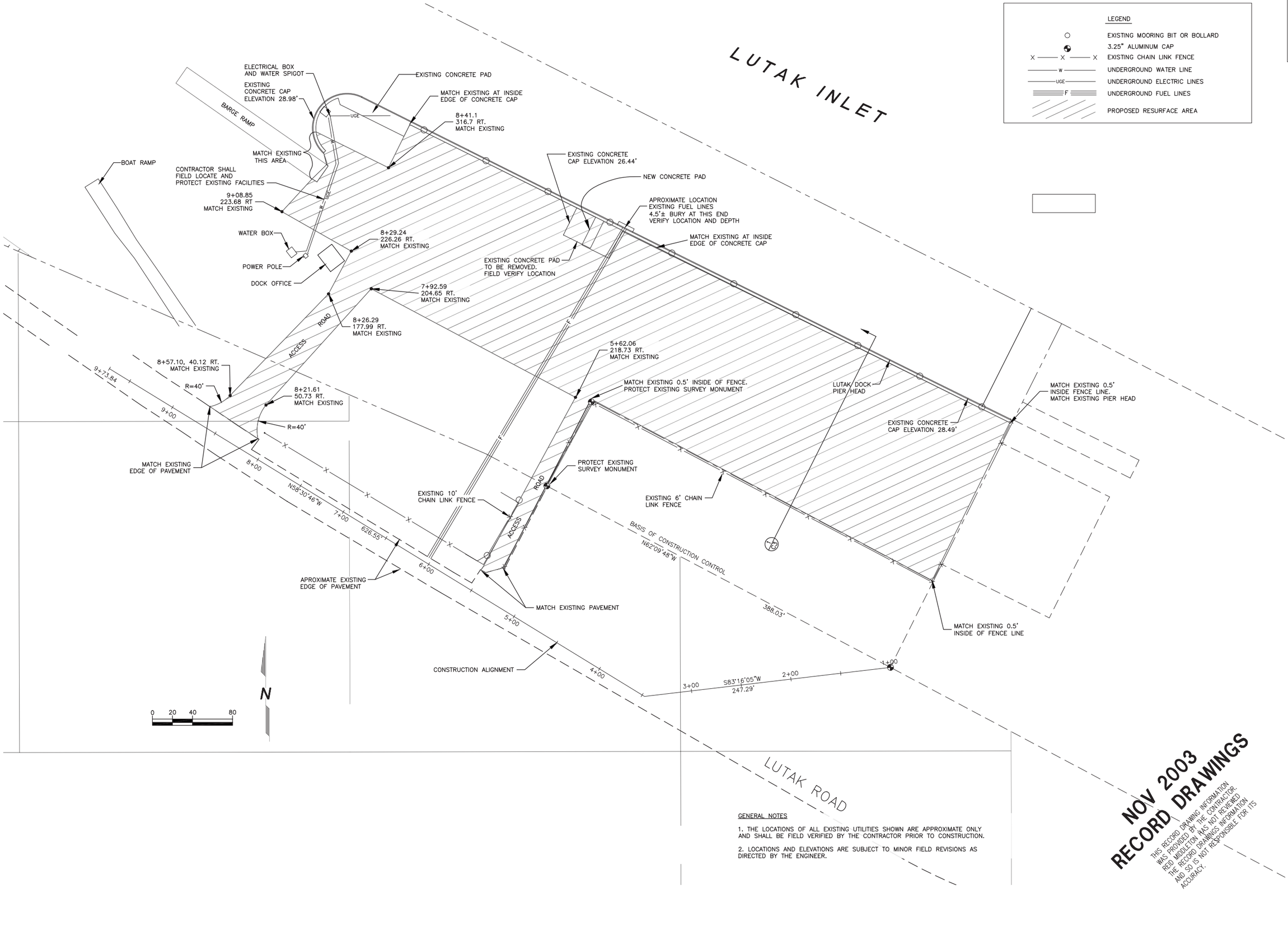
NO. | DATE | BY | REVISION

LUTAK DOCK REHABILITATION
CITY OF HAINES – EDA PROJECT NO. 07–79–04967

EXISTING SITE PLAN

DWG 695600MAST
DES. MJ
DR. CB
CH. RH
F.B. –
DATE
JOB NO. 40–02–010
SHEET NO. C1
OF 15 SHEETS



GENERAL NOTES

1. THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

2. LOCATIONS AND ELEVATIONS ARE SUBJECT TO MINOR FIELD REVISIONS AS DIRECTED BY THE ENGINEER.

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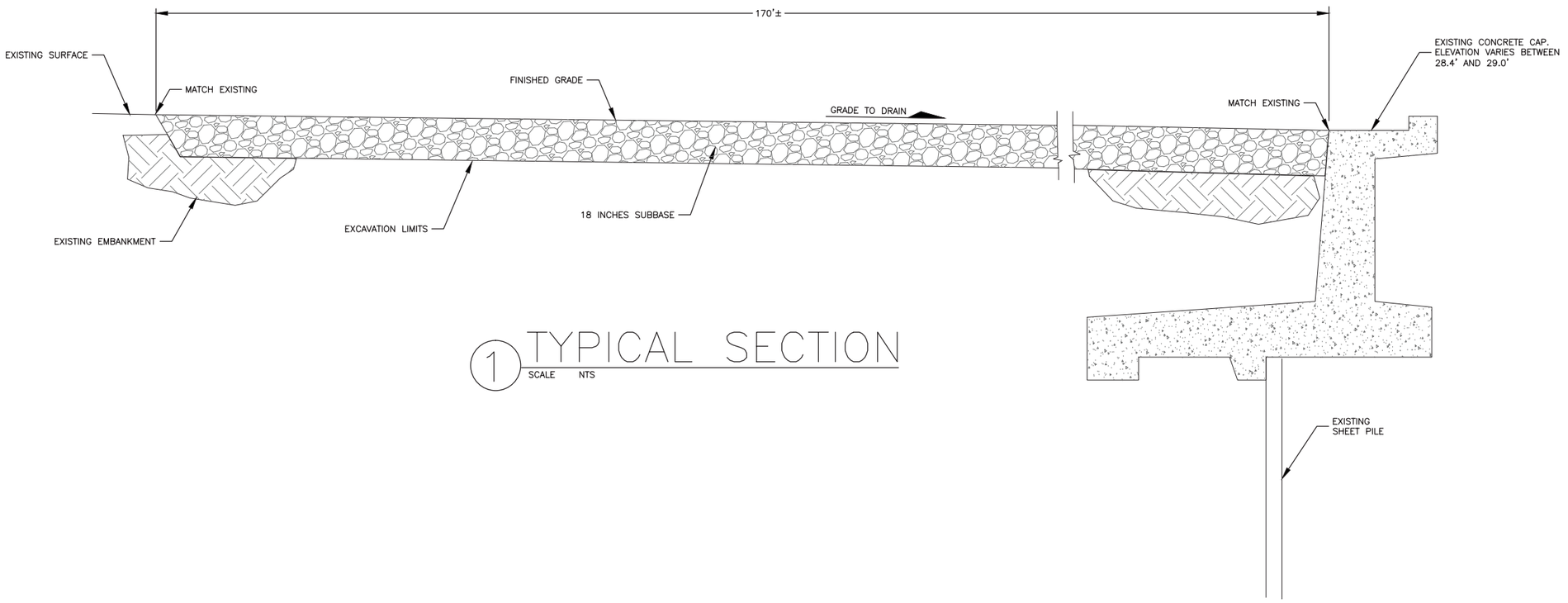
NO.	DATE	BY	REVISION

LUTAK DOCK REHABILITATION
CITY OF HAINES – EDA PROJECT NO. 07-79-04967

SITE GRADING PLAN

DWG	695600MAST
DES.	CB
DR.	CB
CH.	LM
F.B.	
DATE	
SHEET NO.	C2
OF 15 SHEETS	
JOB NO.	40-01-010



1 TYPICAL SECTION

SCALE NTS

NOV 2003
RECORD DRAWINGS

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NO.	DATE	BY	REVISION

USKH
Architecture•Engineering•Land Surveying•Planning
3031 Clinton Drive
Juneau, Alaska 99801
(907) 790-2901

Reid Middleton
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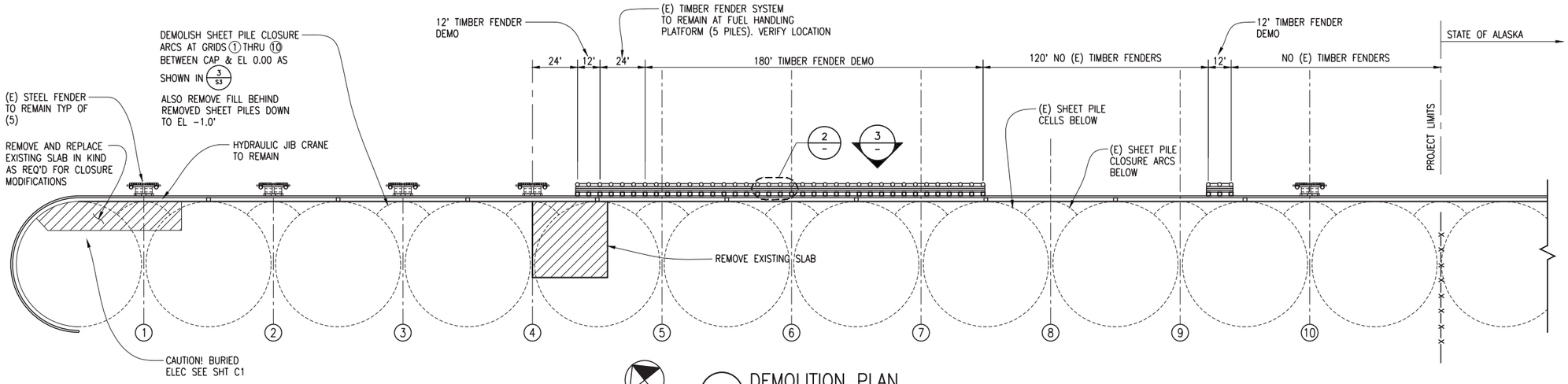
Phone: 907 562-3439
Email: cfross@reidmiddle.com

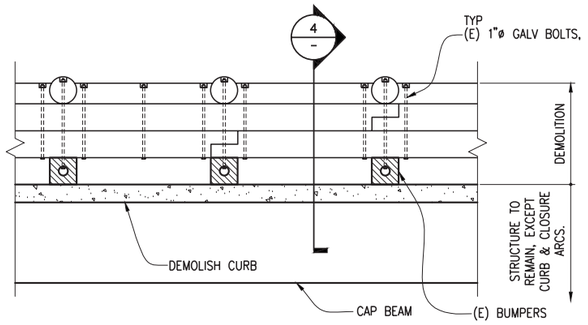
LUTAK DOCK REHABILITATION
CITY OF HAINES – EDA PROJECT NO. 07-79-04967

CIVIL DETAILS

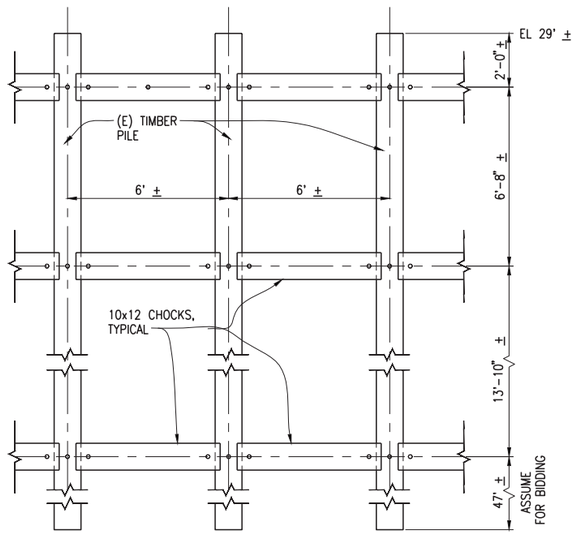
DWG	695600MAST
DES.	CB
DR.	CB
CH.	LM
F.B.	
DATE	
SHEET NO.	C3
	OF 15 SHEETS
JOB NO.	40-02-010



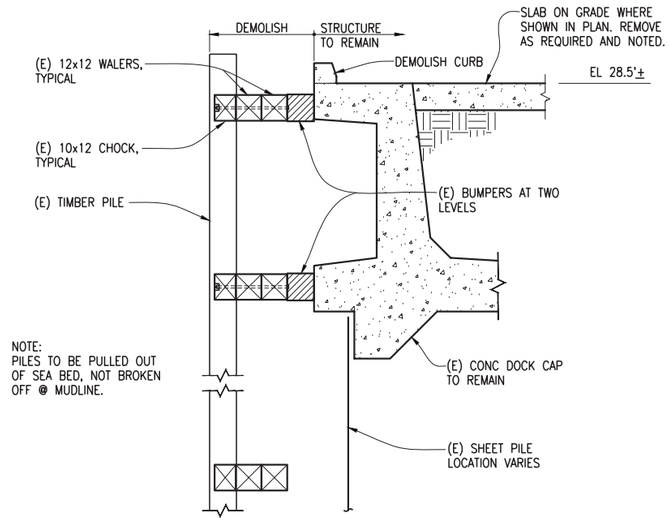
1 DEMOLITION PLAN
SCALE 1" = 30 FEET



2 (E) TIMBER FENDER PARTIAL PLAN
SCALE 3/8" = 1'-0"



3 (E) TIMBER FENDER ELEVATION
SCALE 3/8" = 1'-0"



4 (E) TIMBER FENDER SECTION
SCALE 3/8" = 1'-0"

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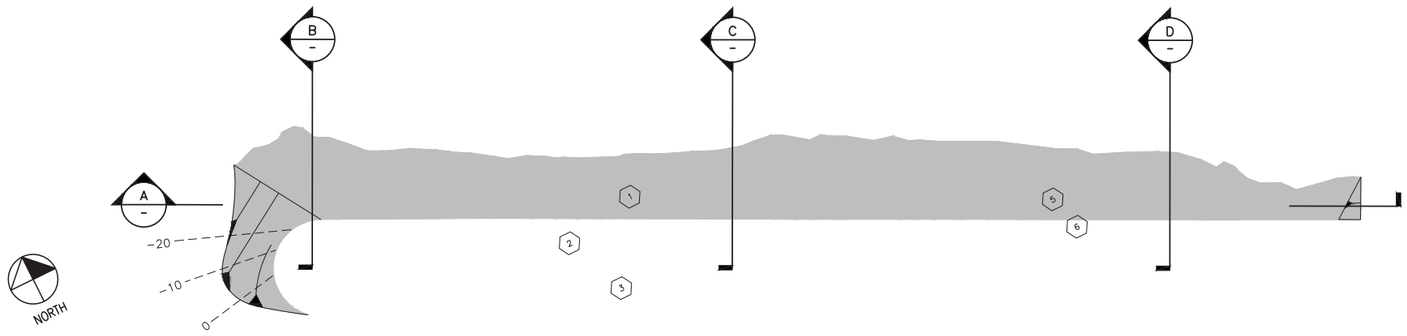
LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES - EDA PROJECT NO. 07-79-04967

DEMOLITION PLAN

DWG
DES.
DR.
CH.
F.B.
DATE
SHEET NO. D1 OF 16 SHEETS
JOB NO. 40-02-010

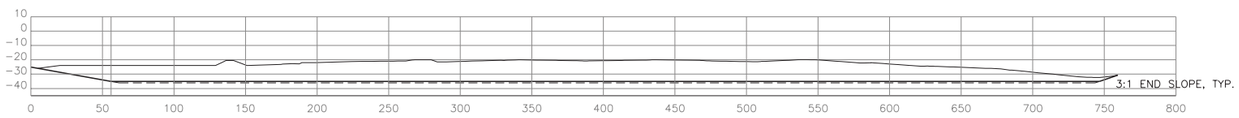


0 25 50 100

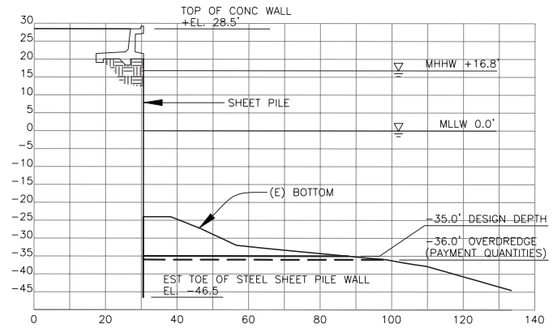
DREDGE PLAN
SCALE: 1"=50'

LEGEND

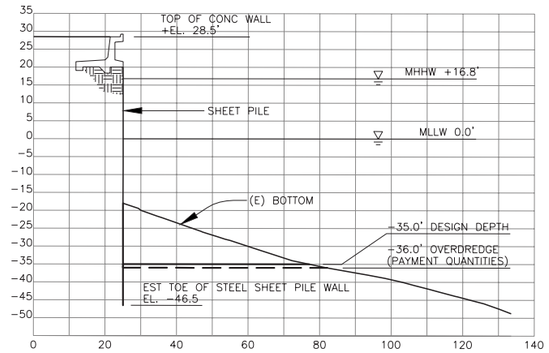
- DESIGN DREDGE PRISM (−35.0')
- ESTIMATED BOTTOM CONTOURS FROM PREVIOUS SURVEY AT BARGE RO/RO RAMP



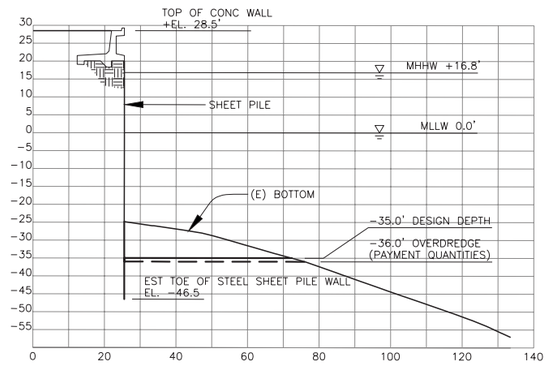
A SECTION
SCALE 1" = 50'



B SECTION
SCALE 1" = 20'



C SECTION
SCALE 1" = 20'



D SECTION
SCALE 1" = 20'

HORIZONTAL CONTROL:

BASIS OF COORDINATES IS
HNS-5 (SE AKDOT&PF) = USKH CONTROL PT 101
SEE SURVEY CONTROL TABLE

THE BASIS OF BEARING FOR THIS SURVEY WAS RECORD INFORMATION PER THE ALASKA TIDELAND SURVEY (ATS) No. 1464. FROM CORNER 1 (USKH 101) TO CORNER 2 (USKH 102) OF TRACT B, ATS 1464, WHICH BEARS N 62°09'48" W.
SEE SURVEY CONTROL TABLE

VERTICAL CONTROL:

SOURCE OF ELEVATION – SE AKDOT&PF

BENCH MARK (HNS-5)

ELEV. = 33.99 ft. (MLLW)

DESC. = ALUMINUM CAP IN A MONUMENT CASE ALONG THE OF A CURB OF THE MEDIAN RUNNING THROUGH FERRY TERMINAL PARKING LOT.

SURVEY CONTROL TABLE

NOTE: COORDINATE VALUES ONLY FOR THIS SURVEY CONTROL NETWORK

POINT NO.	LOCATION	DESCRIPTION	NORTHING	EASTING	ELEV.
101	FERRY TERMINAL PARKING LOT	3-1/4" ALCAP (HNS-5)	10000.00	10000.00	33.99'
102	FERRY TERMINAL PARKING LOT	3-1/4" ALCAP	10181.19	9656.87	

CONTROL NETWORK, TOPO AND BATHYMETRIC DATA WAS COLLECTED February 19 – 22, 2002.
VERTICAL CONTROL LOOPS; February 19, 2002

SURFACE = 6956A Existing ground

LEGEND

- BOLLARD
- TEST HOLE SHANNON & WILSON FEB 2002
- CONTOUR (−132.5−)
- CHAIN LINK FENCE
- ATS PROPERTY LINE
- ADJUSTED PROPERTY LINE
- RESURFACE AREA

TIDAL DATUM

HAINES, CHILKOOT INLET, LYNN CANAL
LAT. 59°13.8' LONG. 135°26.0'

ESTIMATED EXTREME HIGH WATER (EHW) +22.5'
MEAN HIGHER HIGH WATER (MHHW) +16.8'
MEAN HIGH WATER (MHW) +15.8'
MEAN TIDE LEVEL (MTL) +6.7'
MEAN LOW WATER (MLW) +1.6'
MEAN LOWER LOW WATER (MLLW) 0.0'
ESTIMATED EXTREME LOW WATER (ELW) −6.0'

ESTIMATED DREDGE QUANTITIES

	VOLUME (CY)	AREA (SF)
DESIGN EL. −35.0'	9,620	39,545
1 FT OVERDREDGE	1,380	3,765
TOTAL (EL. −36.0')	11,000	43,310

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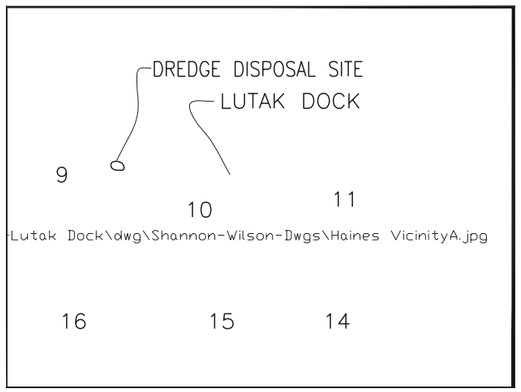
LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES – EDA PROJECT NO. 07-79-04967

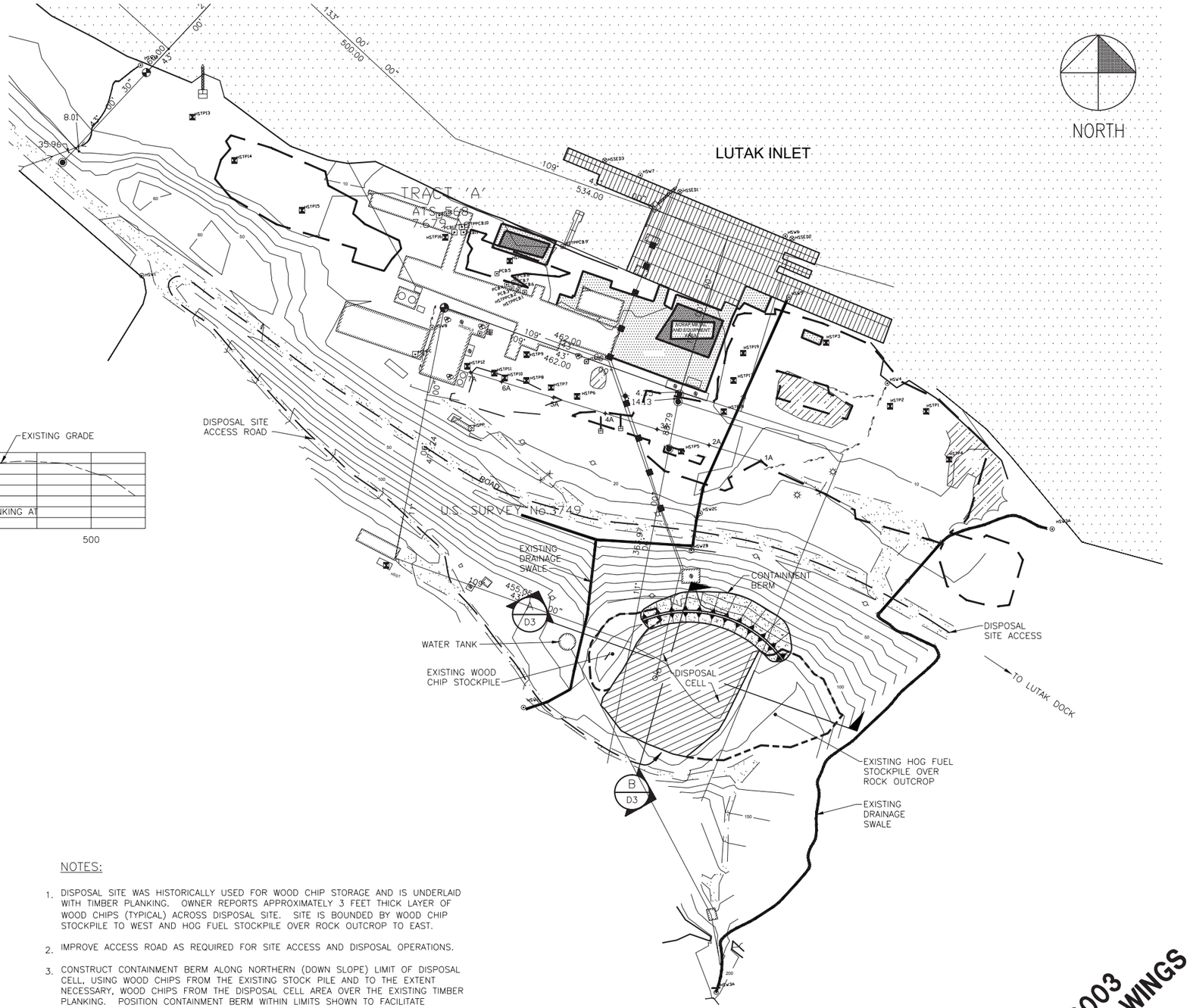
DREDGING PLAN AND SECTIONS

DWG	
DES.	SHEET NO.
DR.	D2
CH.	
F.B.	OF 16 SHEETS
DATE	
JOB NO.	40-02-010



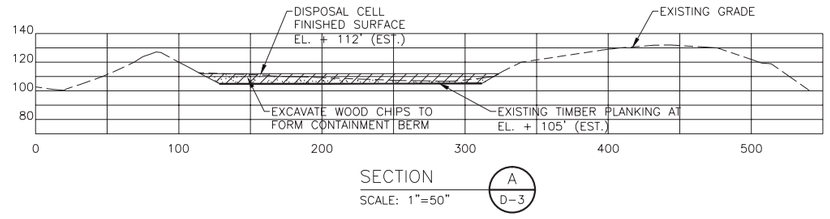
0 0.25 0.5 1.0

SCALE 1" = 0.5 MILE



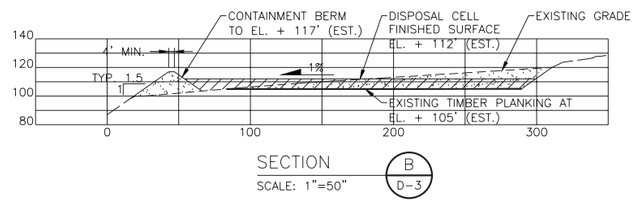
0 50 100 200

SCALE 1" = 100'



SECTION A D-3

SCALE: 1"=50"



SECTION B D-3

SCALE: 1"=50"

LEGEND

- EXISTING DRAINAGE SWALES (INDICATING DIRECTION OF FLOW)
- WOOD CHIPS
- DREDGE MATERIAL DISPOSAL

NOTES:

1. DISPOSAL SITE WAS HISTORICALLY USED FOR WOOD CHIP STORAGE AND IS UNDERLAID WITH TIMBER PLANKING. OWNER REPORTS APPROXIMATELY 3 FEET THICK LAYER OF WOOD CHIPS (TYPICAL) ACROSS DISPOSAL SITE. SITE IS BOUNDED BY WOOD CHIP STOCKPILE TO WEST AND HOG FUEL STOCKPILE OVER ROCK OUTCROP TO EAST.
2. IMPROVE ACCESS ROAD AS REQUIRED FOR SITE ACCESS AND DISPOSAL OPERATIONS.
3. CONSTRUCT CONTAINMENT BERM ALONG NORTHERN (DOWN SLOPE) LIMIT OF DISPOSAL CELL, USING WOOD CHIPS FROM THE EXISTING STOCK PILE AND TO THE EXTENT NECESSARY, WOOD CHIPS FROM THE DISPOSAL CELL AREA OVER THE EXISTING TIMBER PLANKING. POSITION CONTAINMENT BERM WITHIN LIMITS SHOWN TO FACILITATE CONSTRUCTION.
4. SPREAD DREDGE MATERIAL EVENLY THROUGHOUT DISPOSAL CELL TO CREATE A CONSISTENT 1% DOWN SLOPE GRADE.
5. MAINTAIN CONTAINMENT BERM MINIMUM 5 FEET ABOVE FINISHED GRADE OF DISPOSAL MATERIAL CELL. BORROW FROM WOOD CHIP STOCKPILE AS NEEDED TO INCREASE CONTAINMENT DURING CONSTRUCTION.
6. INTENT OF CELL CONTAINMENT IS TO PREVENT FREE DRAINAGE OF DISPOSAL MATERIAL INTO EXISTING DRAINAGE SWALES. MODIFY AND MAINTAIN CONTAINMENT THROUGHOUT CONSTRUCTION AS REQUIRED.

NOV 2003 RECORD DRAWINGS

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NO.	DATE	BY	REVISION

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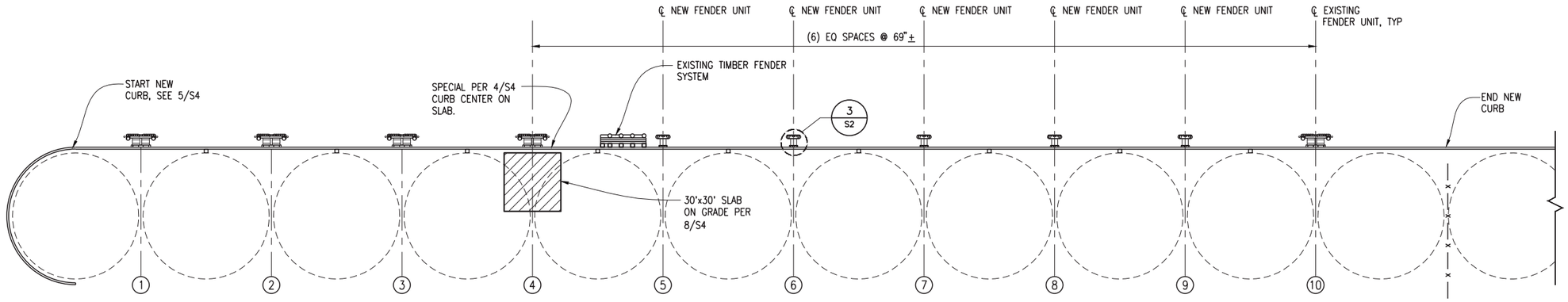
CITY OF HAINES – EDA PROJECT NO. 07-79-04967

LUTAK DOCK REHABILITATION PROJECT

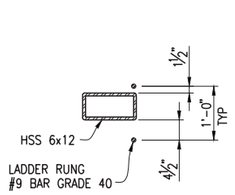
DREDGE DISPOSAL SITE – PLAN AND SECTIONS

DWG	
DES.	SHEET NO.
DR.	
CH.	D3
F.B.	OF SHEETS
DATE	16
JOB NO.	40-02-010

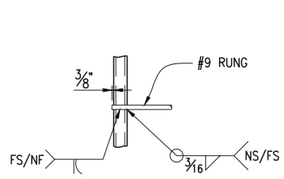


NORTH

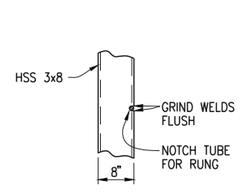
1 FENDER PLAN
SCALE 1" = 30 FEET



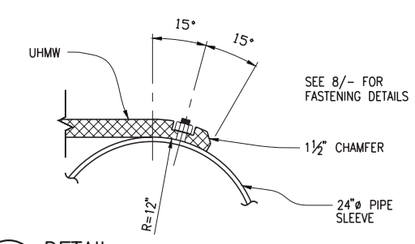
2 DETAIL
SCALE ¾" = 1'-0"



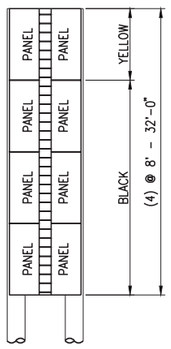
3 DETAIL
SCALE ¾" = 1'-0"



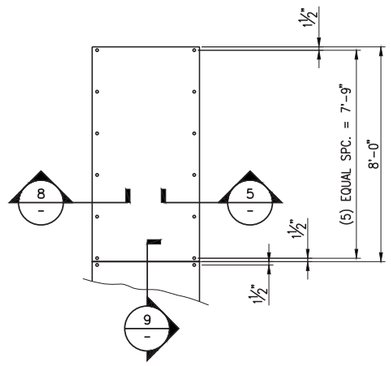
4 DETAIL
SCALE ¾" = 1'-0"



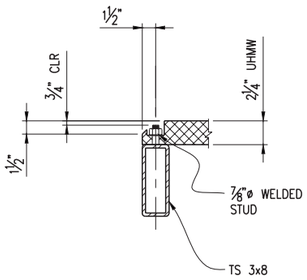
5 DETAIL
SCALE 1½" = 1'-0"



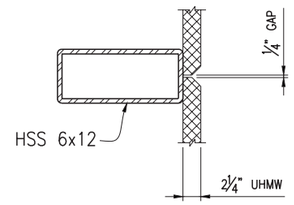
6 DETAIL–UHMW PANEL LAYOUT
SCALE ⅛" = 1'-0"



7 DETAIL–BOLT PATTERN
SCALE ⅜" = 1'-0"



8 SECTION
SCALE 1½" = 1'-0"



9 SECTION
SCALE 1½" = 1'-0"

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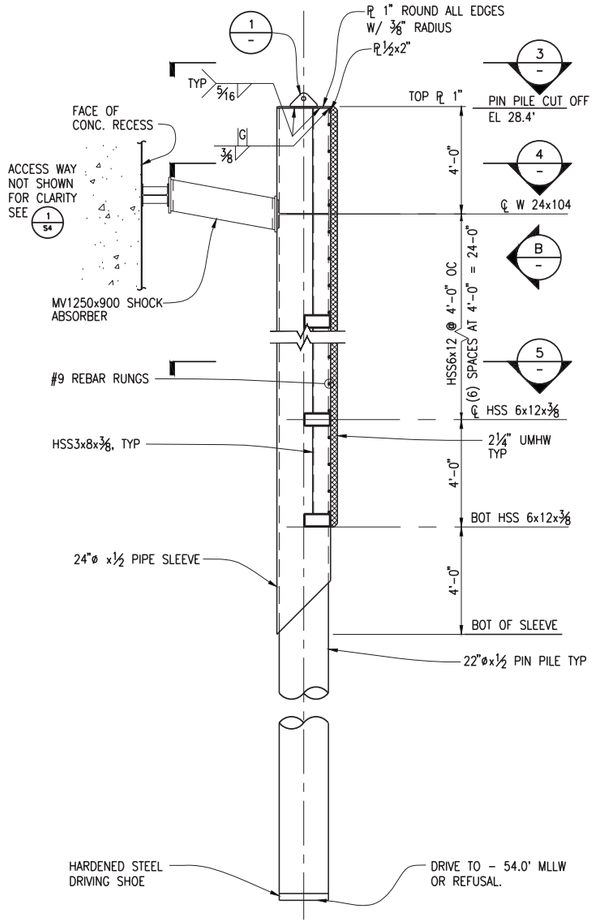
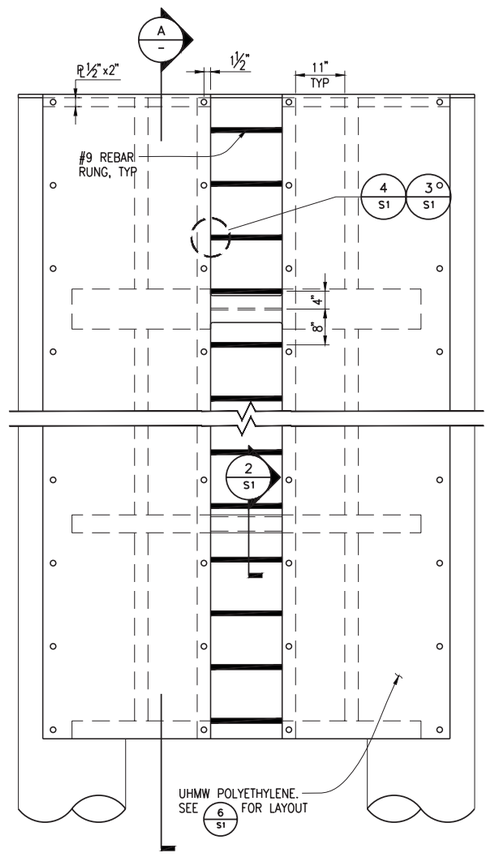
LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES – EDA PROJECT NO. 07-79-04967

FENDER LAYOUT PLAN AND DETAILS

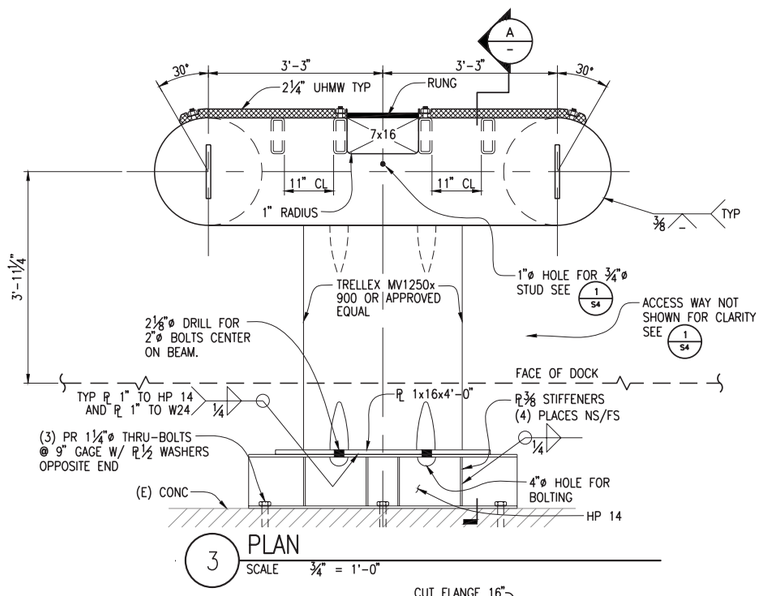
DWG.	
DES.	SHEET NO.
DR.	S1
CH.	
F.B.	OF 16 SHEETS
DATE	
JOB NO.	40-02-010



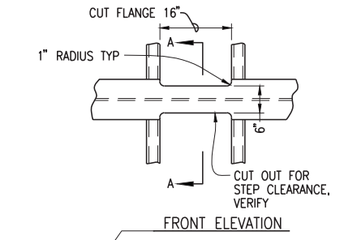
A SECTION
SCALE 3/8" = 1'-0"

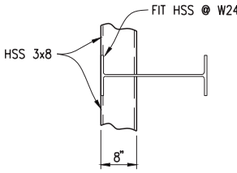


B FACE ELEVATION
SCALE 3/4" = 1'-0"

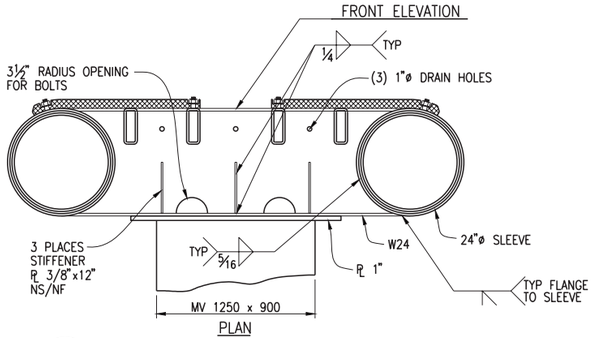


3 PLAN
SCALE ¾" = 1'-0"

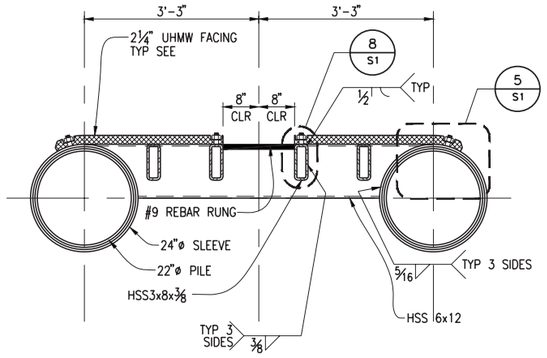




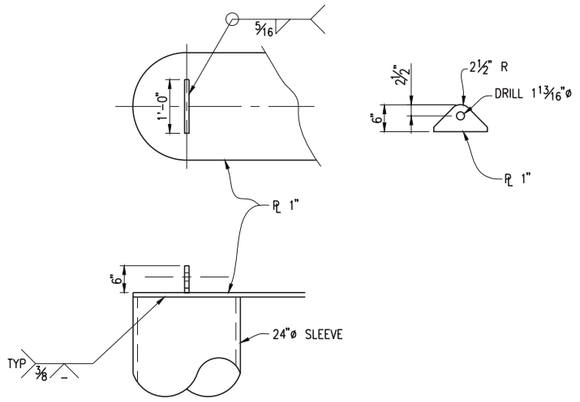
SECTION A–A



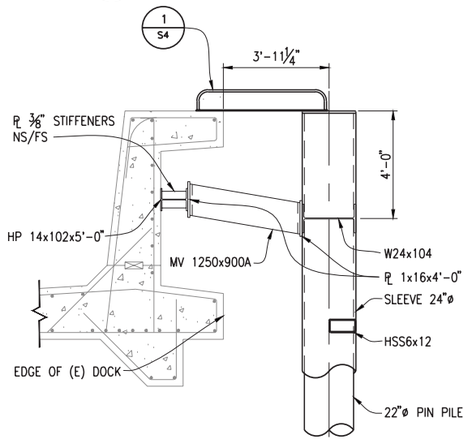
4 SECTION
SCALE ¾" = 1'-0"



5 PLAN SECTION
SCALE ¾" = 1'-0"



1 DETAIL–LIFTING PAD EYE
SCALE ¾" = 1'-0"



2 SECTION
SCALE 3/8" = 1'-0"

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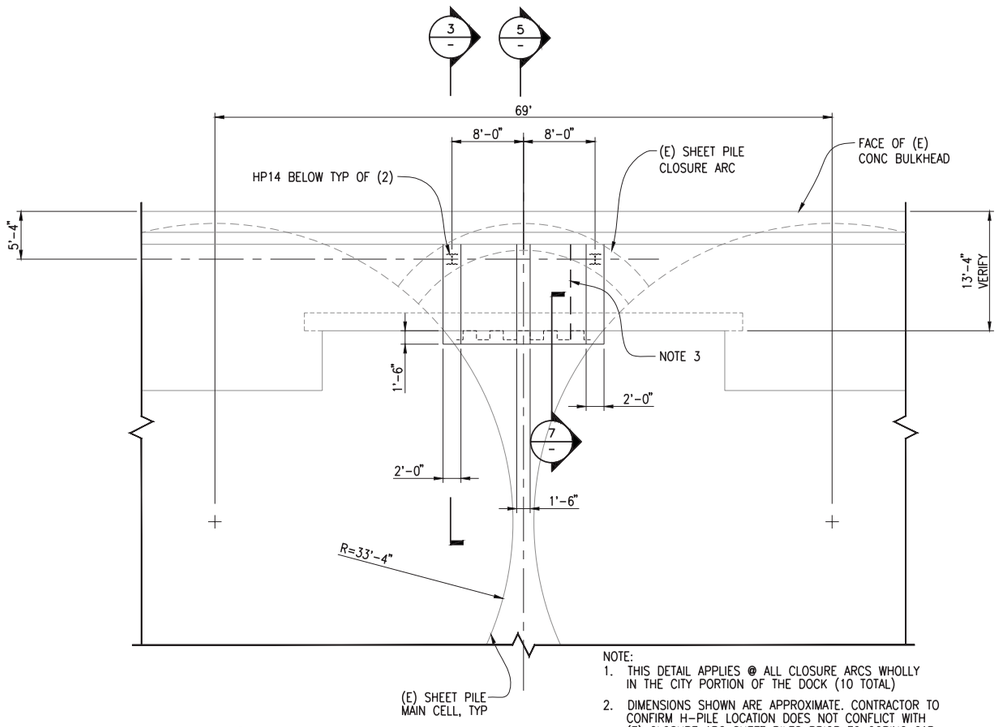
LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES – EDA PROJECT NO. 07-79-04967

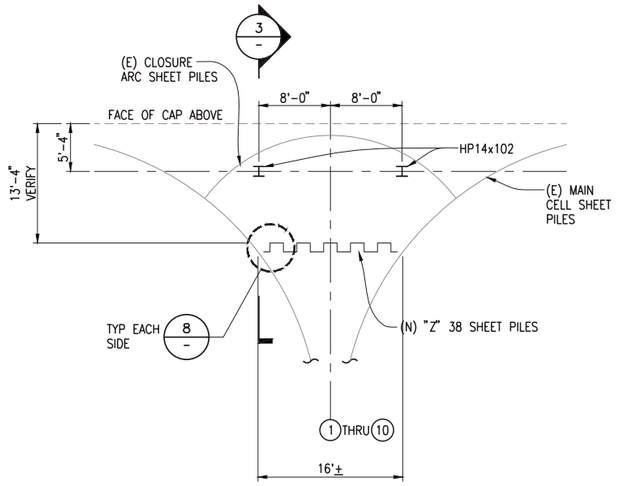
FENDER DETAILS

DWG	
DES.	SHEET NO.
DR.	S2
CH.	
F.B.	OF 16 SHEETS
DATE	
JOB NO.	40-02-010



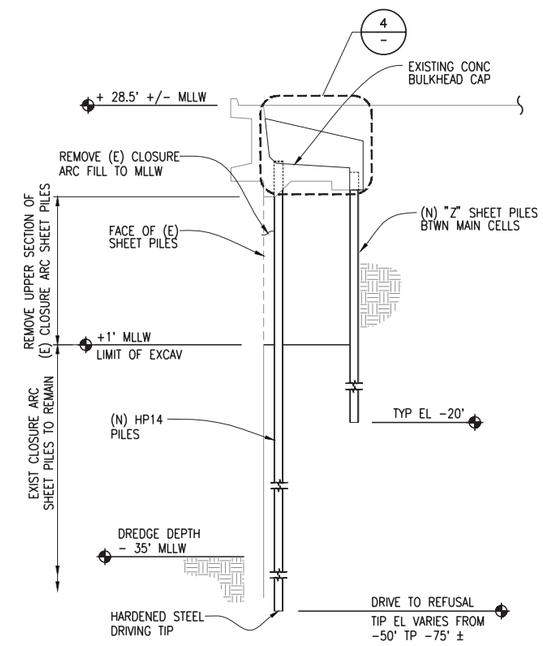
NOTE:
1. THIS DETAIL APPLIES @ ALL CLOSURE ARCS WHOLLY IN THE CITY PORTION OF THE DOCK (10 TOTAL)
2. DIMENSIONS SHOWN ARE APPROXIMATE. CONTRACTOR TO CONFIRM H-PILE LOCATION DOES NOT CONFLICT WITH (E) CLOSURE ARC SHEET PILES PRIOR TO CORING CAP AND DRIVING PILES.
3. BUTTRESS @ CLOSURE ARC 3 IS DOUBLE UP DUE TO ORIGINAL CORE THRU CAP BEAM HITTING CLOSURE AND DRILLING OF SECOND CORE.

1 PARTIAL PLAN @ EL 26' +/- TYP CLOSURE ARC MODIFICATIONS
SCALE 1/8" = 1'-0"

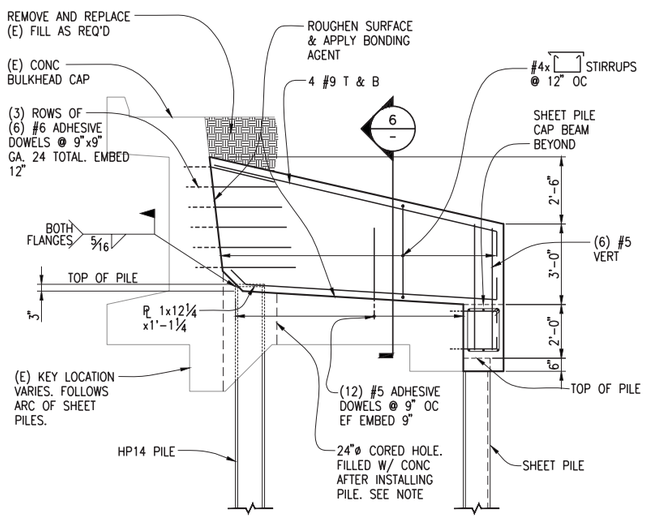


NOTE:
1. THIS DETAIL APPLIES @ ALL CLOSURE ARCS WHOLLY IN THE CITY PORTION OF THE DOCK (10 TOTAL)
2. DIMENSIONS SHOWN ARE APPROXIMATE. CONTRACTOR TO CONFIRM H-PILE LOCATION DOES NOT CONFLICT WITH (E) CLOSURE ARC SHEET PILES PRIOR TO CORING CAP AND DRIVING PILES.

2 PARTIAL PLAN @ EL 0.00'
SCALE 1/8" = 1'-0"

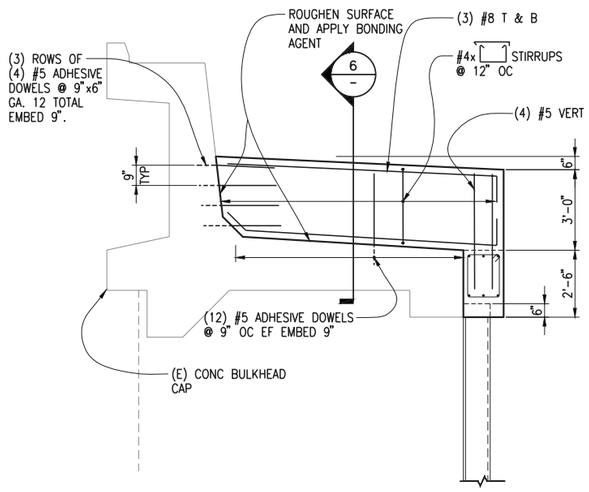


3 SECTION
SCALE 1/8" = 1'-0"



NOTE:
ALTERNATIVELY, HOLES FOR PILES MAY BE SAW-CUT 18" SQUARE. NO OVER CUTTING IS PERMITTED.

4 DETAIL
SCALE 3/8" = 1'-0"



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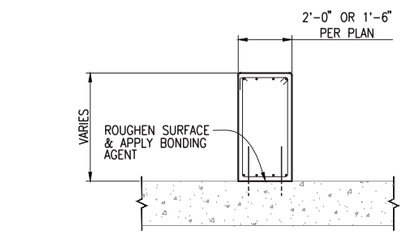
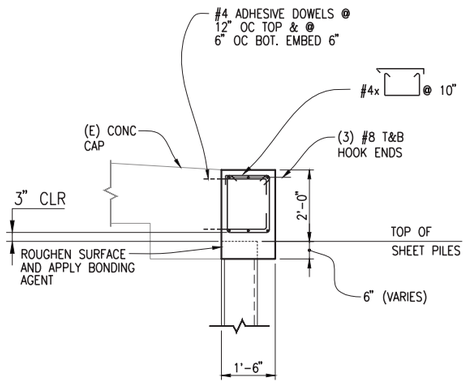
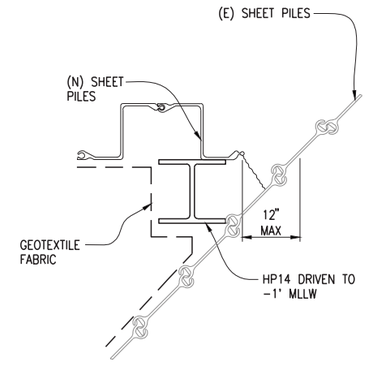


6 SECTION
SCALE 3/8" = 1'-0"



7 DETAIL
SCALE 1/2" = 1'-0"



8 SHEET PILE CLOSURE
SCALE 3/4" = 1'-0"

9 NOT USED
SCALE

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RECORD DRAWINGS
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NO	DATE	BY	REVISION

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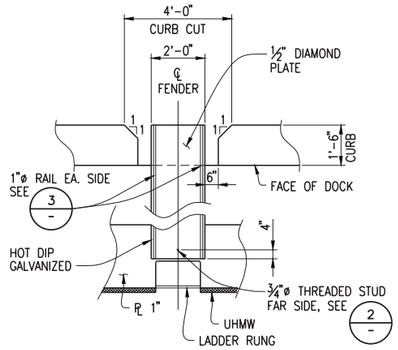
LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES - EDA PROJECT NO. 07-79-04967

CLOSURE ARC MODIFICATIONS

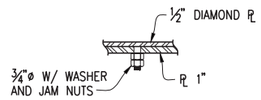
DWG	
DES.	SHEET NO.
DR.	S3
CH.	
F.B.	OF 16 SHEETS
DATE	
JOB NO.	40-02-010



1 ACCESS WAY PLAN

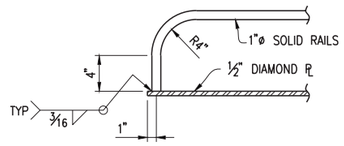
SCALE ⅜" = 1'-0"

REQ'D @ EACH (N) FENDER



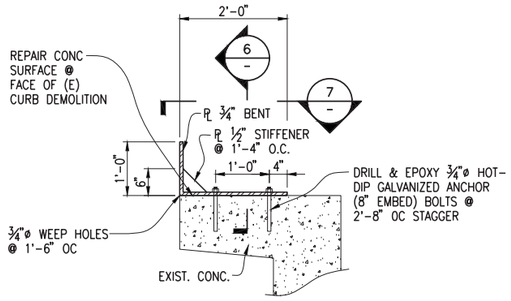
2 THREADED STUD

SCALE 1½" = 1'-0"



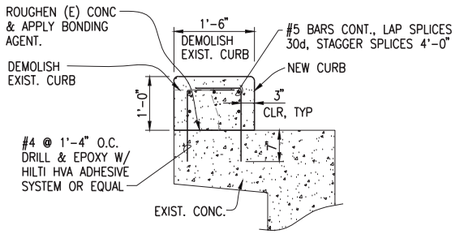
3 RAIL DETAIL

SCALE 1½" = 1'-0"

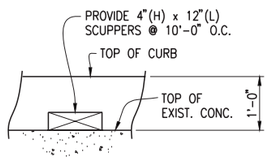


4 SPECIAL CURB

SCALE ¾" = 1'-0"



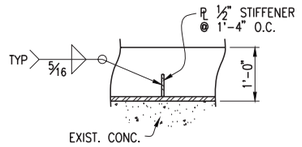
SECTION



ELEVATION

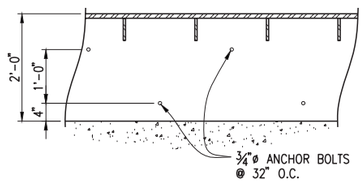
5 CAST-IN-PLACE CURB

SCALE ¾" = 1'-0"



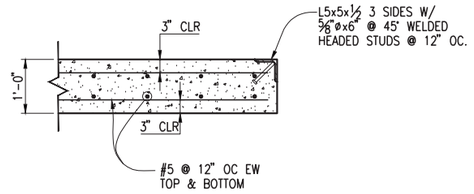
6 SECTION

SCALE ¾" = 1'-0"



7 PLAN

SCALE ¾" = 1'-0"



8 SLAB DETAIL

SCALE ¾" = 1'-0"

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NO.	DATE	BY	REVISION

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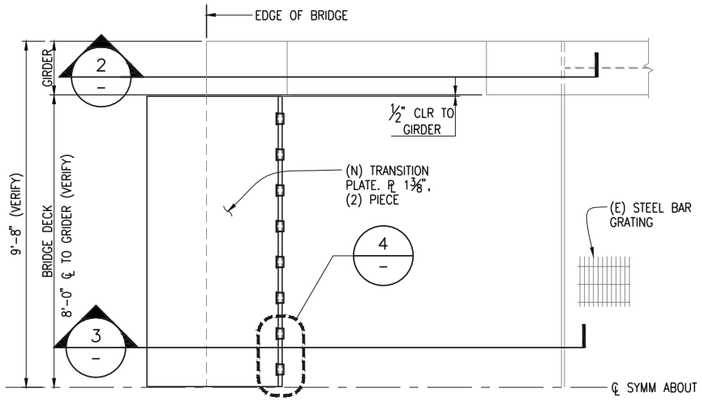
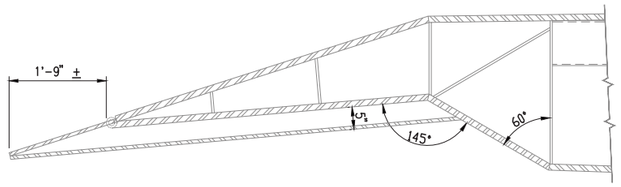
LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES - EDA PROJECT NO. 07-79-04967

MISCELLANEOUS DETAILS

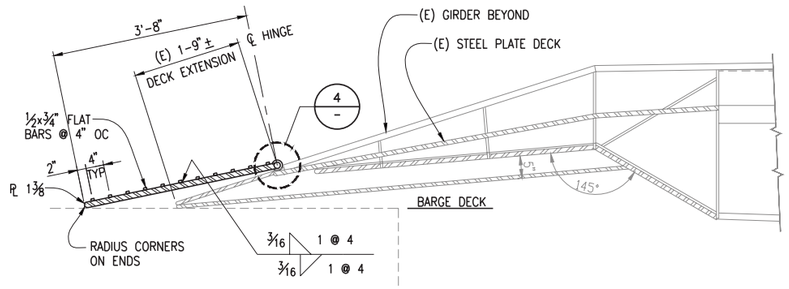
DWG	
DES.	SHEET NO. S4
DR.	
CH.	
F.B.	OF 16 SHEETS
DATE	
JOB NO. 40-02-010	



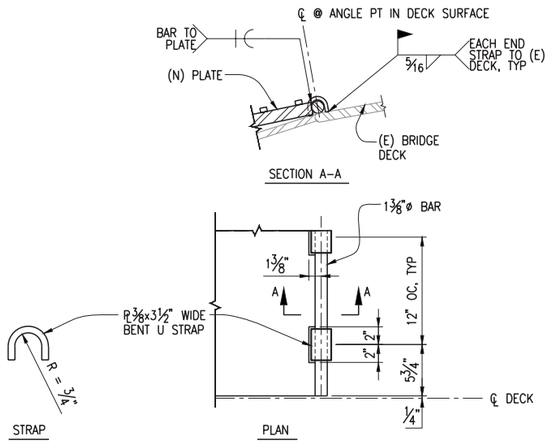
1 END PLAN
SCALE ½" = 1'-0"



2 (E) SECTION @ GIRDER
SCALE ¾" = 1'-0"



3 SECTION @ DECK
SCALE ¾" = 1'-0"



4 HINGE DETAIL
SCALE 1½" = 1'-0"

NOTE:
SEE SHEET C1 FOR TRANSFER BRIDGE (BARGE RAMP) LOCATION

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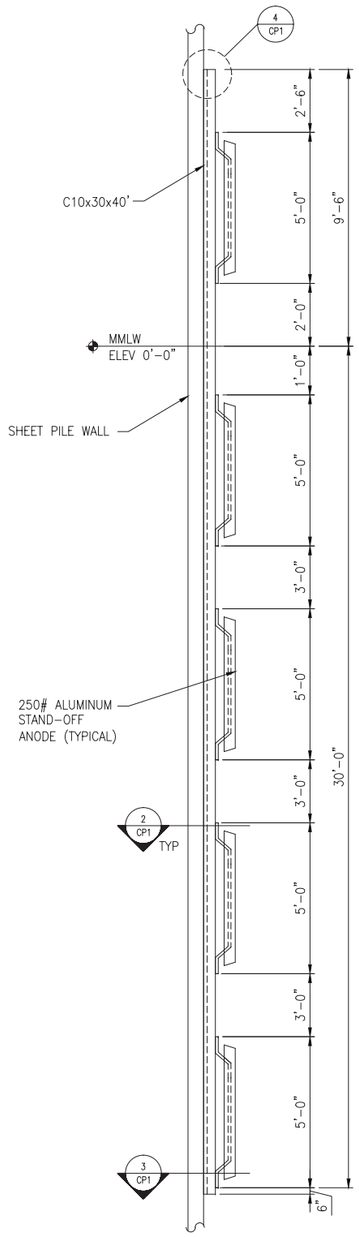
LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES - EDA PROJECT NO. 07-79-04967

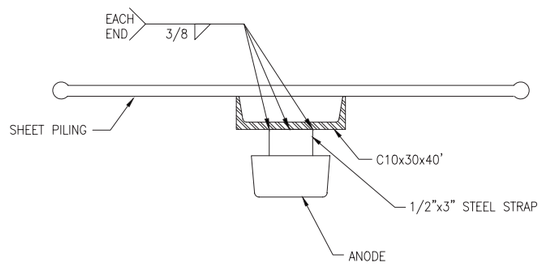
RO-RO TRANSFER BRIDGE

DWG	
DES.	SHEET NO.
DR.	S5
CH.	
F.B.	OF 16 SHEETS
DATE	
JOB NO.	40-02-010



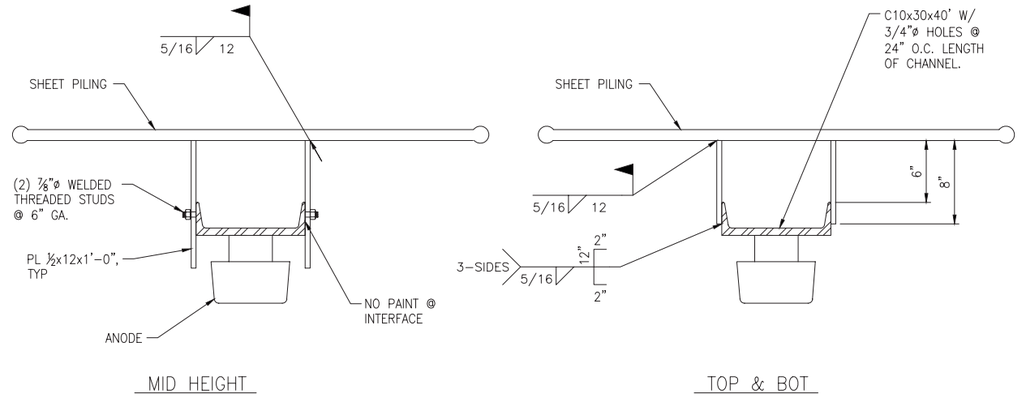
1 CP1 MAIN CELL ANODE ASSEMBLY ELEVATION

N.T.S.



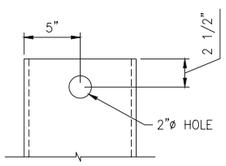
2 CP1 ANODE ASSEMBLY MOUNTING DETAIL

N.T.S.



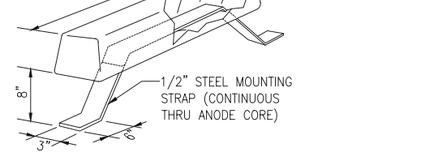
3 CP1 CHANNEL MOUNTING DETAIL

N.T.S.



4 CP1 ANODE CHANNEL LIFT LUG

N.T.S.



5 CP1 STAND-OFF ANODE DETAIL

N.T.S.

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Email: cfross@reidmiddleton.com

NO.	DATE	REVISION
		BY

LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES - EDA PROJECT NO. 07-79-04967

CATHODIC PROTECTION DETAILS

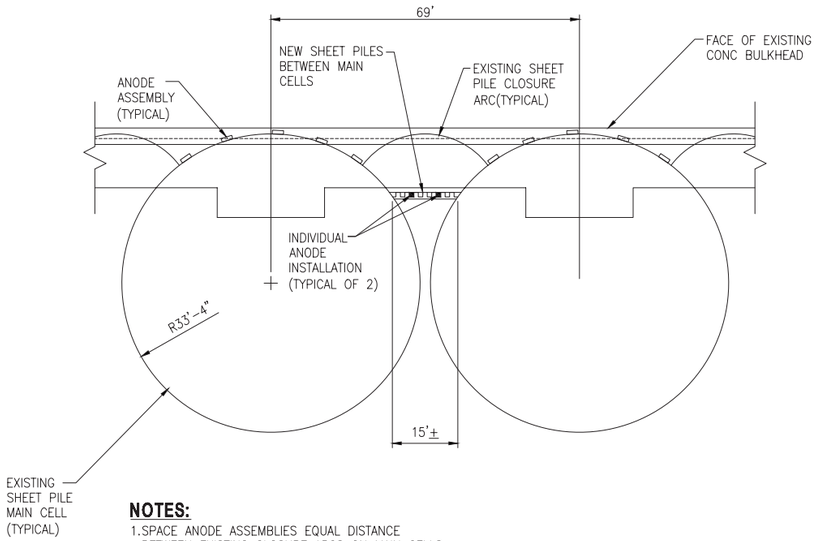
DWG

DES. CDS
DR. LAI
CH. TB
F.B.

SHEET NO. CP1 OF SHEETS

DATE

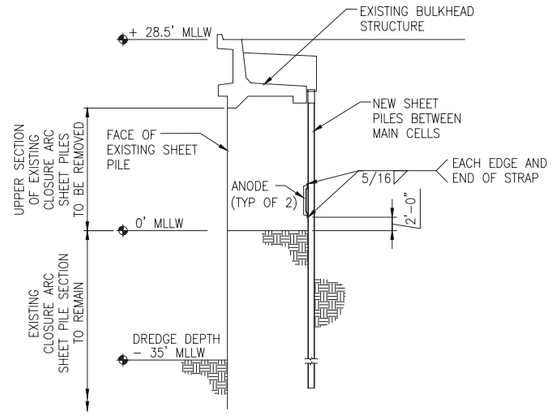
JOB NO. 40-02-010



NOTES:

1. SPACE ANODE ASSEMBLIES EQUAL DISTANCE BETWEEN EXISTING CLOSURE ARCS ON MAIN CELLS.
2. START ASSEMBLY ORIENTATION AS CLOSE AS POSSIBLE TO EXISTING ARC

1 CP2 ANODE ASSEMBLY ORIENTATION
N.T.S.



NOTES:

1. INSTALL TWO(2) NEW ANODES AT EACH CLOSURE ARC LOCATION. SPACE ANODES EQUAL DISTANCE (HORIZONTALLY) BETWEEN MAIN CELLS.
2. INSTALL EACH ANODE APPROXIMATELY FIVE(5) FEET IN FROM THE MAIN CELL WALLS.

2 CP2 CLOSURE ARC ANODE INSTALLATION DETAIL
N.T.S.

CATHODIC PROTECTION NOTES

GENERAL

A. The Contractor shall provide all labor, equipment and materials required for a complete galvanic anode cathodic protection system. The cathodic protection system shall include the appropriate anodes, channels and all necessary items of equipment and materials for a completed system.

B. Corrosion control materials shall be submitted to the Engineer for approval. A complete list of equipment and materials, including name and manufacturer, catalog number, size, finish and other pertinent data shall be provided. The following items shall be included in the submittals:

1. Aluminum anodes
2. Epoxy Coating
3. Channels (Mill test certificates)
4. Welders qualifications & weld procedures

PRODUCTS

A. All materials shall conform to the requirements set forth herein or as shown. All materials must be new, free from defects, and shall be of the best commercial quality for the purpose specified. All necessary items and accessories not shown or specified herein, but which are required to fully carry out the specified intent of the work, shall be furnished without additional cost.

B. Aluminum stand-off anode shall be 250 lb. weight and shall have a 1/2"x3" steel mounting strap continuous through the core. Anodes shall conform to the following chemical composition. The 250 lb. weight is the weight of the anode material and excludes the weight of the strap.

Element	%
Indium	0.014 to 0.020
Zinc	3.0 to 5.0
Silicon	0.08 max.
Mercury	0.09 max.
Tin	0.001 max.
Others(each)	0.001 max.
Aluminum	Remainder
Iron	0.097% max

"The chemical composition noted above is the chemical composition of the Purity Casting Alloys anodes. The standard chemical composition of the Galvaium III offshore aluminum anodes is also acceptable. Other anode composition must be approved by the Owner's Representative."

C. Coating shall be Sherwin-Williams Dura-Plate 235 or Engineer approved equal. Color shall be gray.

D. Channels shall be C10x30x40', ASTM A36 steel.

E. Welds shall use 60 KSI minimum rod. Welders and procedures shall be qualified per A.W.S.

EXECUTION

A. Anodes shall be installed as shown. Anodes shall be installed on channel assemblies on the main cells and directly attached to the new sheet pile closure arcs. Anodes, damaged as a result of improper handling, shall be replaced.

B. Remove all marine growth and clean all surfaces that the anodes and anode channel are being installed to.

C. Each end of the anode straps shall be welded to the anode channel or the new closure arc sheet pile. A continuous weld is required on each side and the end of the straps.

D. The anode channels shall be welded to the main cells at the top, bottom and mid-height of the channels. Both sides of the channel shall be welded at these locations.

E. Main cell anodes assemblies and individual anodes being installed on the new sheet piling shall be installed at equal distances between anodes/assemblies.

F. Coat the mounting straps, channels, and welds of the anode assembles and individual closure arc anodes, after fabrication, with one coat (4 to 8 mills DFT) of the coating per the manufacturer's recommendations. Ensure that no coating is applied to the anode surface. Touch-up of the coating at the welds to the sheet piles is not required.

G. All welders shall be AWS (or equal) qualified for the welding and procedures performed by them. Provide certificates of their testing and qualification for all procedures, including wet welding procedures.

H. Weld Inspection: Coordinate dry weld visual inspections with the Owner's Representative. Owner's Representative will visually inspect welds of anodes to channels, prior to coating the assemblies, and will visually inspect the dry welds of the anode assemblies to the sheet piles. Contractor shall provide a photographic record (video or still photography) of all wet welds for review by the Owner's Representative

NOV 2003
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NO. | DATE | BY | REVISION

LUTAK DOCK REHABILITATION PROJECT
CITY OF HAINES - EDA PROJECT NO. 07-79-04967

CATHODIC PROTECTION NOTES AND DETAILS

DWG
DES. CDS
DR. LAI
CH. TB
F.B.
DATE
SHEET NO. CP2
OF SHEETS
JOB NO. 40-02-010

TABLE 1

STEEL THICKNESS DATA

MAIN CELL or CLOSURE ARC		ULTRASONIC THICKNESS READINGS, (inches)					
		Elevation of Reading					
ID No.	Location	Elev.	Reading 1	Reading 2	Reading 3	Reading 4	Average
MAIN CELLS							
2	6 o'clock Position	+8'	0.340	0.340	0.340		0.340
4	4 o'clock Position	+3'	0.225	0.225	0.225		0.225
		-12'	0.390	0.390	0.395		0.392
6	6 o'clock Position	0'	0.375	0.380	0.370		0.375
10	6 o'clock Position	+8'	0.400	0.395	0.400		0.398
		+4'	0.360	0.375	0.365		0.367
		0'	0.205	0.210	0.210		0.208
		-12'	0.295	0.315	0.285		0.298
		-20'	0.175	0.190			0.183
		-20'	0.305	0.355	0.340		0.333
CLOSURE ARCS							
3.5	8 o'clock Position	+3'	0.245	0.250	0.250	0.250	0.249
		+8'	0.295	0.245	0.240	0.245	0.256
		-21' MDL	0.235	0.235	0.210		0.227
6.5	6 o'clock Position	+3'	0.150	0.280	0.125		0.185
		-3'	0.220	0.220	0.225		0.222
		-24.5'	0.360	0.360	0.370		0.363
	8 o'clock Position	+2'	0.115	0.115	0.120	0.188	0.135
9.5	8 o'clock Position	+3'	0.150	0.150	0.150	0.150	0.150
		+3'	0.185	0.215	0.220	0.250	0.218
		-7'	0.245	0.250	0.185	0.245	0.231
		-21'	0.235	0.350	0.350	0.355	0.323

TABLE 2

CORROSION PROFILE DATA

READING LOCATION	POTENTIAL READINGS, (V) *All readings are to $Cu/CuSO_4$					
	Reading Elevation (ft)					
	Surface	-5'	-10'	-15'	-20'	-25'
CELL 1						
8 o'clock Position	0.978	0.948	0.928	0.905	0.893	0.898 / MDL
CLOSURE ARC 1.5						
4 o'clock Postion	0.869	0.869	0.866	0.857	0.855	.850 / MDL
CELL 2						
8 o'clock Position	1.028	0.990	0.980	0.965	0.945	.968 / MDL
CLOSURE ARC 2.5						
4 o'clock Postion	0.897	0.897	0.901	0.893	0.890	0.848 / MDL
CELL 3						
8 o'clock Position	0.941	0.909	0.909	0.902	0.911	.939 / MDL
CLOSURE ARC 3.5						
4 o'clock Postion	0.860	0.860	0.860	0.859	.858 / MDL	
CELL 4						
8 o'clock Position	0.941	0.938	0.926	0.920	0.905	.905 / MDL
CLOSURE ARC 4.5						
4 o'clock Postion	0.868	0.868	0.869	0.870	.863 / MDL	
CELL 5						
8 o'clock Position	0.918	0.895	0.871	0.863	0.858	.859 / MDL
CLOSURE ARC 5.5						
4 o'clock Postion	0.850	0.847	0.846	0.835	0.835	.838 / MDL
CELL 6						
8 o'clock Position	0.888	0.913	0.912	0.953	0.946	.912 / MDL
CLOSURE ARC 6.5						
4 o'clock Postion	0.854	0.858	0.865	0.870	0.867	.870 / MDL

TABLE 2

CORROSION PROFILE DATA

READING LOCATION	POTENTIAL READINGS, (V) *All readings are to $Cu/CuSO_4$					
	Reading Elevation (ft)					
	Surface	-5'	-10'	-15'	-20'	-25'
CELL 7						
8 o'clock Position	0.893	0.881	0.883	0.894	0.900	.910 / MDL
CLOSURE ARC 7.5						
4 o'clock Postion	0.832	0.830	0.838	0.836	.845 / MDL	
CELL 8						
8 o'clock Position	0.923	0.912	0.926	0.900	0.901	.912 / MDL
CLOSURE ARC 8.5						
4 o'clock Postion	0.882	0.864	0.861	0.859	0.859	.860 / MDL
CELL 9						
8 o'clock Position	0.910	0.921	0.918	0.924	.911 / MDL	
CLOSURE ARC 9.5						
4 o'clock Postion	0.855	0.860	0.865	0.857	.857 / MDL	
CELL 10						
8 o'clock Position	0.880	0.884	0.887	0.895	0.890	.887 / MDL
CLOSURE ARC 10.5						
4 o'clock Postion	0.830	0.827	0.825	0.837	0.829	.828 / MDL
CELL 11						
8 o'clock Position	0.880	0.905	0.883	0.887	0.875	.869 / MDL