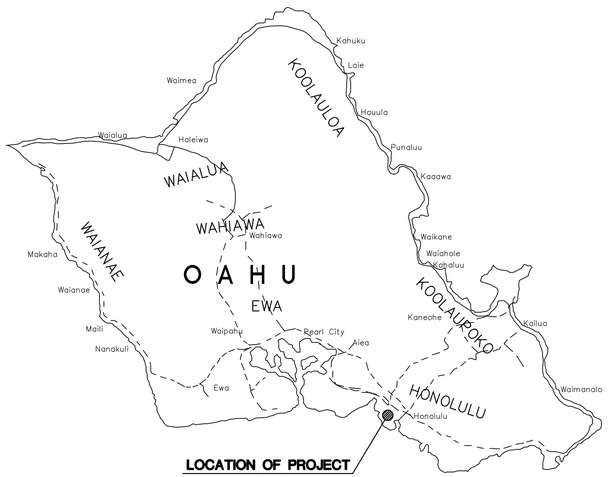
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

FOR THE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

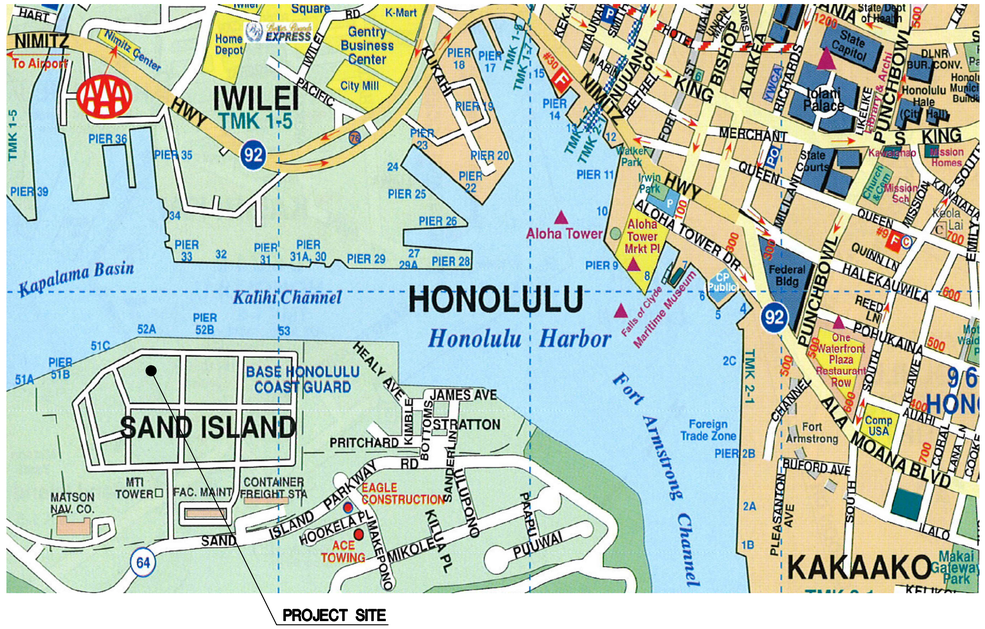
S10954



ISLAND OF OAHU

LOCATION MAP

NOT TO SCALE



VICINITY MAP

NOT TO SCALE

CONSULTANTS:

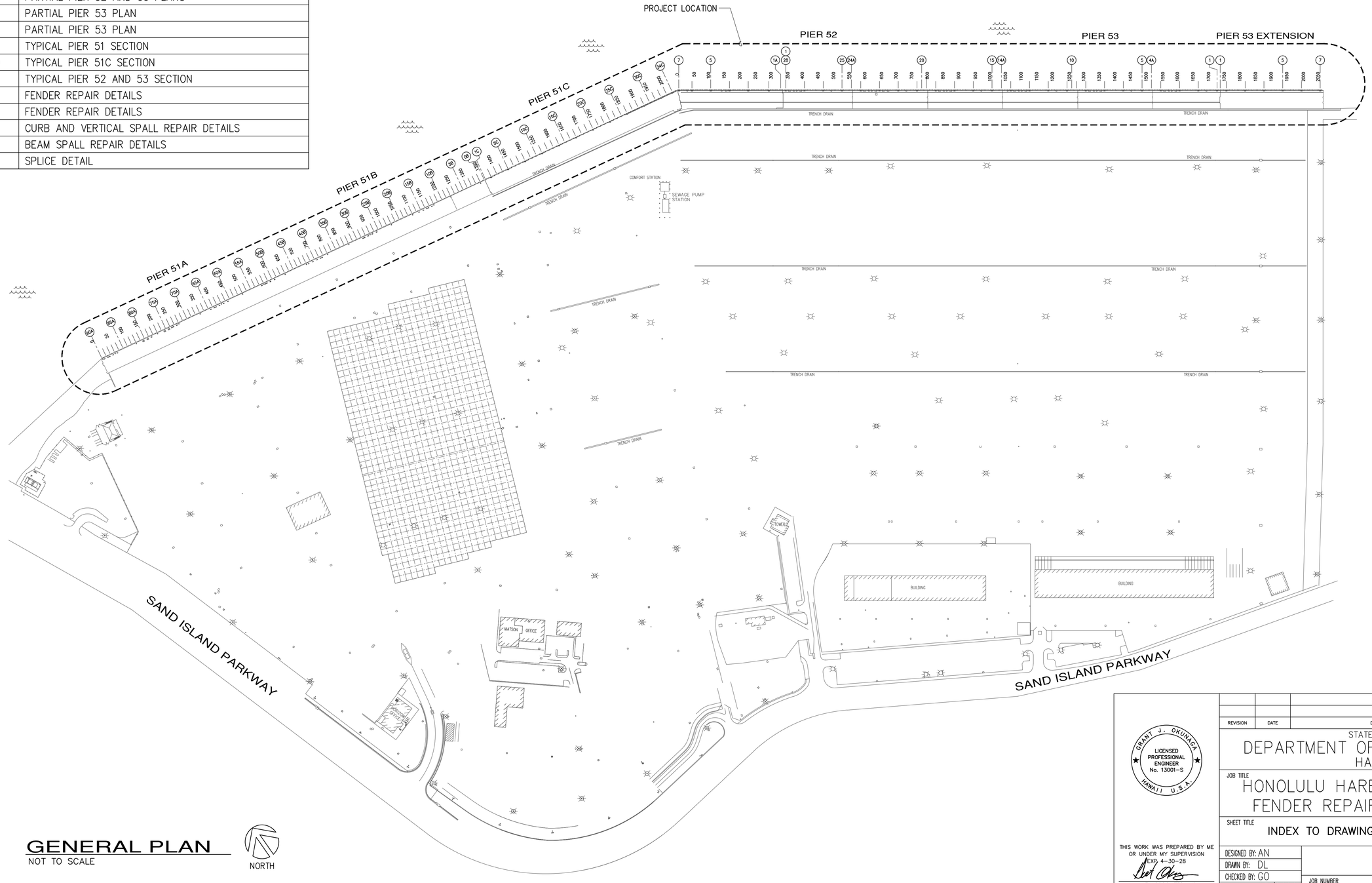
MKE ASSOCIATES LLC
STRUCTURAL ENGINEER

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

APPROVED BY: _____ 05/08/2026
FOR DIRECTOR OF TRANSPORTATION — DATE

SHEET T-1
1 OF 18 SHTS

INDEX TO DRAWINGS



GENERAL PLAN

NOT TO SCALE

NORTH

GRANT J. OKUNAGA
LICENSED PROFESSIONAL ENGINEER
No. 13001-S
HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
EXP. 4-30-28
MKE ASSOCIATES LLC

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

SHEET TITLE
INDEX TO DRAWINGS AND GENERAL PLAN

DESIGNED BY:	AN
DRAWN BY:	DL
CHECKED BY:	GO
DATE:	05/2026
SCALE:	AS SHOWN

JOB NUMBER
S10954

SHEET
T-2
2 OF 18 SHTS.

Plotted: May 07, 2026 - 12:04pm

STRUCTURAL NOTES:

GENERAL:

1. WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE HAWAII STATE BUILDING CODE (AMENDED IBC, 2018 EDITION) AND THE HAWAII STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION, 2005, FOR THE STATE OF HAWAII, UNLESS OTHERWISE INDICATED. HOWEVER, SHOULD THERE BE CONFLICTS, OR WHERE REFERENCE IS MADE TO PERFORMANCE CONFORMING TO OTHER STANDARDS THE MORE STRINGENT SHALL APPLY.
2. THE CONTRACTOR SHALL COMPARE PLANS, SPECIFICATIONS AND ALL OTHER CONTRACT DOCUMENTS WITH EACH OTHER AND REPORT IN WRITING TO THE HARBORS CONSTRUCTION ENGINEER ALL INCONSISTENCIES AND OMISSIONS.
3. THE CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AND VERIFY FIELD CONDITIONS AND SHALL COMPARE SUCH FIELD MEASUREMENTS AND CONDITIONS WITH THE DRAWINGS BEFORE COMMENCING WORK. REPORT IN WRITING TO THE HARBORS CONSTRUCTION ENGINEER ALL INCONSISTENCIES AND OMISSIONS.
4. CONTRACTOR SHALL RESOLVE ANY DISCREPANCIES AND QUESTIONS PRIOR TO THE START OF WORK. NO EXTRA PAYMENT SHALL BE ALLOWED ON ACCOUNT OF WORK MADE NECESSARY BY CONTRACTORS FAILURE TO VISIT THE SITE AND/OR FAILURE TO RESOLVE DISCREPANCIES AND QUESTIONS.
5. THE CONTRACTOR SHALL PROTECT ALL UTILITIES AND STRUCTURES IN AND ADJACENT TO THE PROJECT SITE. ANY DAMAGE SHALL BE REPAIRED TO THE SATISFACTION OF THE HARBORS CONSTRUCTION ENGINEER AND PAID FOR BY THE CONTRACTOR.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK OF ALL TRADES.
7. THE CONTRACTOR SHALL COORDINATE HIS/HER WORK WITH OTHER CONTRACTORS WITHIN THE PROJECT AREA. THE CONTRACTOR SHALL ALSO COORDINATE WITH THE HARBORS OAHU DISTRICT MANAGER AND CONSTRUCTION ENGINEER FOR AN APPROVED STAGING AND STORAGE AREA AND FOR RESTRICTIONS OF HARBORS OPERATIONS OVER REPAIR AREAS.
8. THE CONTRACTOR SHALL REMOVE ALL DEBRIS RESULTING FROM HIS/HER WORK AS REQUIRED FOR PUBLIC HEALTH AND SAFETY AND TO THE SATISFACTION OF THE HARBORS CONSTRUCTION ENGINEER. SHOULD THE STATE PERFORM ANY OF THE ABOVE WORK DUE TO NON-PERFORMANCE BY THE CONTRACTOR, THE CONTRACTOR AGREES TO REIMBURSE THE STATE FOR ALL COSTS INCURRED.
9. HARBOR OPERATIONS TAKE PRECEDENCE OVER CONSTRUCTION ACTIVITY. THE CONTRACTOR MUST WORK AROUND HARBOR OPERATIONS SO THAT THE PIER WILL REMAIN OPERATIONAL. WEEKEND WORK MAY BE REQUIRED AND SHALL BE COORDINATED WITH THE HARBORS CONSTRUCTION ENGINEER AND TENANTS IN ADVANCE.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR METHODS OF CONSTRUCTION, WORKMANSHIP AND JOB SAFETY. THE CONTRACTOR SHALL PROVIDE TEMPORARY SHORING AND BRACING AS REQUIRED FOR STABILITY OF STRUCTURAL MEMBERS AND SYSTEMS.
11. ALL WORK SPECIFIED IN THE CONTRACT BUT NOT LISTED SEPARATELY SHALL BE CONSIDERED INCIDENTAL AND WILL NOT BE PAID FOR SEPARATELY.
12. NOTES AND DETAILS ON THE PLANS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. SHOULD THERE BE CONFLICTS BETWEEN THE REQUIREMENTS OF THE PLANS OR SPECIFICATIONS, THE MORE STRINGENT SHALL APPLY.
13. THE CONTRACTOR SHALL COMPLY WITH THE CLEAN WATER ACT AND THE STATE HARBORS STORMWATER MANAGEMENT PROGRAM. NO POLLUTANTS ARE ALLOWED TO BE DISCHARGED DIRECTLY OR INDIRECTLY INTO ADJACENT HARBOR WATER, THROUGH THE HARBORS SMALL MS4 OR OTHER POTENTIAL PATHWAYS.
14. THE CONTRACTOR WILL BE RESPONSIBLE FOR REGULATORY FINES OR PENALTIES THAT MAY BE IMPOSED BY ENVIRONMENTAL REGULATORY AGENCIES (USEPA AND/OR STATE DOH) IN THE EVENT OF VIOLATIONS.
15. THE CONTRACTOR SHALL SUBMIT A SITE-SPECIFIC BEST MANAGEMENT PRACTICES (BMP) PLAN TO THE HARBORS ENGINEERING BRANCH FOR REVIEW AND ACCEPTANCE PRIOR TO THE START OF ANY CONSTRUCTION WORK. THIS BMP PLAN SHALL COMPLY WITH THE TEMPORARY WATER POLLUTION, DUST, AND EROSION CONTROL ARTICLE IN THE SPECIFICATIONS AND PROPOSAL.
16. IN CASE OF SPILL, LEAK OR OTHER RELEASE CONTAINING A HAZARDOUS SUBSTANCE OR OIL, THE CONTRACTOR SHALL NOTIFY APPROPRIATE FACILITY PERSONNEL, EMERGENCY RESPONSE AGENCIES, AND REGULATORY AGENCIES FOLLOWING NOTIFICATION PROCEDURES, AND SHALL NOTIFY THE HARBORS CONSTRUCTION ENGINEER AND ENVIRONMENTAL HOTLINE (808-587-1962) IMMEDIATELY (I.E., WITHIN 24 HOURS). SUCH CONTACT INFORMATION MUST BE IN LOCATIONS THAT ARE READILY ACCESSIBLE AND AVAILABLE.
17. TIDAL DATA MAY NOT REPRESENT CONDITIONS THAT OCCUR DURING CONSTRUCTION AND ACTUAL WATER LEVELS WILL VARY FROM LEVELS INDICATED. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN ESTIMATES OF WATER LEVELS WHICH MAY OCCUR DURING CONSTRUCTION. VARIATION FROM TIDAL LEVELS INDICATED OR CONTRACTOR'S ESTIMATION OF TIDAL LEVELS WILL NOT BE CONSIDERED AS A CLAIM FOR ADDITIONAL COMPENSATION OR DELAY OF WORK.

CONCRETE:

1. CONCRETE CONSTRUCTION SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE ACI 318R-14 AND ACI 546R-14.
2. FORMED CONCRETE SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH OF f'c=5,000 PSI WITH FLY ASH AND CORTEC MCI 2005 NS MIGRATING CORROSION INHIBITING ADMIXTURE, OR APPROVED EQUAL.
3. MAXIMUM AGGREGATE SIZE SHALL BE ⅜ INCHES AND SHALL BE COORDINATED WITH CONCRETE PREPARATION PROCEDURES FOR SPALL REPAIRS.
4. CONCRETE DELIVERY TICKETS SHALL RECORD ALL FREE WATER IN THE MIX: AT BATCHING BY PLANT, FOR CONSISTENCY BY DRIVER, AND ANY ADDITIONAL REQUEST BY THE CONTRACTOR IF PERMITTED BY THE MIX DESIGN.
5. MAXIMUM WATER TO CEMENTITIOUS MATERIALS RATIO SHALL BE 0.40.
6. PATCHING COMPOUND FOR FORM AND POUR SPALL REPAIRS SHALL BE SIKACRETE 211 SCC PLUS BY SIKA, OR APPROVED EQUAL.
7. PATCHING COMPOUND FOR REPAIRING VERTICAL AND SOFFIT SPALLS IN LIFTS SHALL BE SIKAQUICK VOH WITH LATEX R BY SIKA, OR APPROVED EQUAL.
8. REINFORCING BARS, ANCHOR BOLTS, INSERTS, AND OTHER ITEMS TO BE CAST IN THE CONCRETE SHALL BE SECURED IN POSITION PRIOR TO PLACEMENT OF CONCRETE.

REINFORCING STEEL:

1. STAINLESS STEEL REINFORCING STEEL SHALL BE DEFORMED DUPLEX STAINLESS STEEL BARS (UNS S32304) CONFORMING TO ASTM A276/A276M, ASTM A955/A955M, AND ASTM A959/A959M, GRADE 60.
2. CLEAR CONCRETE COVER FOR REINFORCING BARS SHALL BE 3 INCHES MINIMUM, UNLESS OTHERWISE NOTED.
3. BAR BENDS AND HOOKS SHALL BE STANDARD HOOKS IN ACCORDANCE WITH ACI 318.
4. REINFORCING STEEL SHALL BE SPLICED AS INDICATED ON PLANS.
5. ANTI-CORROSION COATING WITH A MINIMUM 7 DAY OPEN TIME FOR REINFORCING STEEL SHALL BE ARMATEC 110 EPOCEM BY SIKA OR APPROVED EQUAL.
6. EPOXY FOR GROUTING OF DOWELS SHALL BE SET-3G BY SIMPSON STRONG-TIE COMPANY INC., OR APPROVED EQUAL.
7. TIE WIRE SHALL BE PLASTIC-COATED, STAINLESS STEEL, OR MADE OF DIELECTRIC OR OTHER ACCEPTABLE MATERIAL. ALL LOOSE REINFORCING STEEL SHALL BE SECURED WITH TIES AT ALL INTERSECTIONS WITH ADJACENT REINFORCING STEEL.

PREPARATION OF SUBSTRATE AND REINFORCING STEEL FOR SPALL REPAIRS:

1. SURFACE PREPARATION FOR SPALL REPAIRS SHALL FOLLOW THE INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI) GUIDELINE NO. 310.1R-2008.
2. BOTH SPALLS AND DELAMINATIONS ARE REFERRED TO ON THE DRAWINGS AS "SPALLS", AS THE REPAIR PROCEDURES ARE THE SAME FOR BOTH CONDITIONS.
3. THE CONTRACTOR SHALL SOUND ALL CONCRETE SURFACES TO IDENTIFY SPALLS AND DELAMINATIONS.
4. ANY ELEMENT BEING REPAIRED SHALL NOT BE SUBJECTED TO LIVE LOADS DURING THE PERIOD STARTING FROM THE REMOVAL OF EXISTING CONCRETE UNTIL THE REPAIR CONCRETE HAS OBTAINED A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. PREPARATION OF SUBSTRATE AND REINFORCING STEEL FOR SPALL REPAIRS SHALL BE PERFORMED IN THE ORDER LISTED BELOW.
6. THE SPALLED AND DELAMINATED CONCRETE SHALL BE COMPLETELY REMOVED TO SOUND SUBSTRATE AND BEYOND THE EXTENT OF THE CORRODED REINFORCING. THE CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS TO AVOID DAMAGING THE UNDERLYING SOUND CONCRETE.
7. THE SPALLED AND DELAMINATED EDGES SHALL BE SQUARED BY SAW-CUTTING AND CHIPPING THE CONCRETE AT THE PERIMETER BEYOND THE REMOVAL AREA AS NECESSARY TO ATTAIN A MINIMUM DEPTH OF ¾ INCH AND TO PREVENT FEATHER EDGE CONDITIONS. EXERCISE GREAT CARE TO AVOID CUTTING OR DAMAGING ANY EXISTING EMBEDDED STEEL REINFORCING. ANGLES BETWEEN ADJACENT SAW-CUTS AROUND THE PERIMETER SHALL NOT BE LESS THAN 90 DEGREES AND THE SHAPE OF EACH PATCH SHALL NOT BE IRREGULAR.
8. FOR ANY EXPOSED REINFORCEMENT WITHIN THE REPAIR AREA, ADDITIONAL CONCRETE SHALL BE REMOVED FOR A MINIMUM ¾ INCH CLEAR SPACE MEASURED RADIALLY AROUND THE BARS.
9. EXISTING CONCRETE SURFACES WITHIN THE REPAIR AREAS SHALL BE ROUGHENED TO ENSURE PROPER ADHESION WITH REPAIR CONCRETE.
10. ALL EXPOSED CONCRETE SURFACES IN THE REPAIR AREA SHALL BE NEEDLE GUNNED TO REMOVE ALL SCALE, LOOSE RUST, DEBRIS AND DETERIORATED CONCRETE. AVOID DAMAGING EXISTING EPOXY COATED STEEL.
11. ANY EXISTING REINFORCEMENT WITH DAMAGED EPOXY COATING SHALL BE CALLED TO THE ATTENTION OF THE HARBORS CONSTRUCTION ENGINEER.
12. THE PATCH AREA SHALL BE CLEANED OF ALL DUST AND DEBRIS JUST PRIOR TO PATCHING WITH HIGH PRESSURE, OIL-FREE COMPRESSED AIR WITH APPROPRIATE PPE'S AND CONTAINMENT.

APPLICATION OF SPALL REPAIR MATERIALS:

1. ALL DAMAGED EPOXY COATING ON EXISTING REINFORCING STEEL SHALL BE REPAIRED.
2. ALL EXPOSED STEEL IN THE REPAIR AREA SHALL BE LIBERALLY COATED WITH ANTI-CORROSION COATING PER MANUFACTURER'S RECOMMENDATIONS.
3. PRIOR TO PLACEMENT OF REPAIR CONCRETE, ALL CONCRETE REPAIR SURFACES SHALL BE WASHED WITH CLEAN WATER AND THE EXPOSED CONCRETE SURFACE SHALL BE SATURATED WITH NO WATER ACCUMULATION ON THE SURFACE.
4. ALL VERTICAL AND OVERHEAD REPAIRS GREATER THAN 4 SQUARE FEET SHALL BE FORMED.
5. THE CONTRACTOR SHALL NOT SECURE FORMS BY RAMSETTING. ALL HOLES AND SPALLS CAUSED BY TEMPORARY ATTACHMENTS SHALL BE PATCHED. ALL INSERTS SHALL BE REMOVED OR SHALL BE STAINLESS STEEL WITH MINIMUM ¾ INCH COVER AFTER FORM REMOVAL.
6. PATCHING COMPOUND MAY BE USED INSTEAD OF FORMED CONCRETE FOR VERTICAL AND OVERHEAD REPAIRS LESS THAN OR EQUAL TO 4 SQUARE FEET IN AREA. A SLURRY COAT OF THE COMPOUND SHALL BE USED TO PRIME THE SUBSTRATE AND THE MATERIAL SHALL BE APPLIED IN LIFTS PER MANUFACTURER'S RECOMMENDATIONS.
7. SNAP TIES AND OTHER NON-REMOVABLE INSERTS SHALL BE PLASTIC OR STAINLESS STEEL.
8. WITH THE EXCEPTION OF THE TOP SURFACE AND FRONT FACE OF THE OUTBOARD FASCIA BEAM, ALL FORMED CONCRETE REPAIRS SHALL BE BUILT UP TO OR BEYOND THE ORIGINAL SURFACE AND SHALL MAINTAIN A 3 INCH MINIMUM CLEAR COVER FOR REINFORCING.
9. CONCRETE REPAIRS AT THE TOP SURFACE AND FRONT FACE OF THE OUTBOARD FASCIA BEAM SHALL BE BUILT UP TO THE ORIGINAL CONCRETE SURFACE.
10. CONCRETE REPAIRS SHALL MATCH AND MAINTAIN EXISTING CHAMFER EDGES AND EXPANSION JOINTS. CONTRACTOR SHALL INSTALL JOINT FILLER TO MAINTAIN JOINTS.
11. REPAIR CONCRETE SHALL BE VIBRATED, RODDED OR TAMPED DURING PLACEMENT TO CONSOLIDATE THE POUR AND FILL ALL CORNERS OF THE PATCH OR FORM AND BENEATH THE REINFORCING.
12. THERE SHALL BE NO COLD JOINTS IN THE FIELD OF THE REPAIR.
13. THE REPAIRED SURFACE FINISH SHALL MATCH THE ORIGINAL SURFACE FINISH.
14. VOID SPACES BEYOND THE EDGE OF THE FORM SHALL BE DRY PACKED IN LIFTS WITH PATCHING COMPOUND.
15. FORMWORK FOR CONCRETE REPAIRS SHALL NOT BE REMOVED FOR A MINIMUM OF 24 HOURS AND UNTIL CONCRETE HAS OBTAINED A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
16. CONCRETE REPAIRS SHALL BE CURED BY COVERING THE SURFACE WITH A CURING COMPOUND APPROVED BY THE HARBORS CONSTRUCTION ENGINEER.

FENDER REPAIRS:

1. CYLINDRICAL FENDERS SHALL BE HIGH PERFORMANCE SUPER ABRASION RESISTANT FENDERS (HPSAR) FURNISHED BY TRELLEBORG MARINE SYSTEMS NORTH AMERICA, INC., OR APPROVED EQUAL.
2. THE CONTRACTOR SHALL FIELD VERIFY THE FENDER REPAIR QUANTITIES AND CONSULT WITH THE HARBORS CONSTRUCTION ENGINEER PRIOR TO ORDERING FENDERS. THE HARBORS OAHU DISTRICT MAINTENANCE MAY REQUEST ADDITIONAL FENDERS TO BE STOCKPILED FOR FUTURE REPAIRS.
3. FENDER CHAINS AND ALL HARDWARE SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION PER ASTM A123, UNLESS OTHERWISE NOTED.
4. COTTER PINS SHALL BE TYPE 316 STAINLESS STEEL.

STRUCTURAL STEEL:

1. PADEYES AND EYE BOLT ASSEMBLIES SHALL BE FABRICATED AS SHOWN FROM STRUCTURAL STEEL CONFORMING TO ASTM A36, UNLESS OTHERWISE NOTED.
2. PADEYES AND EYE BOLT ASSEMBLIES, AND ALL HARDWARE SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION PER ASTM A123, UNLESS OTHERWISE NOTED.
3. WELDLESS RING SHALL HAVE A STOCK DIAMETER OF 1-1/4 INCHES AND AN INSIDE DIAMETER OF 5 INCHES AND SHALL BE FORGED WITH AN ULTIMATE STRENGTH OF 85,000 LBS.
4. WELDS AND WELDING PROCEDURES SHALL CONFORM TO THE STRUCTURAL WELDING CODE AWS D1.1 OF THE AMERICAN WELDING SOCIETY.
5. WELDING ELECTRODES SHALL BE E70XX.
6. GALVANIZING REPAIR PAINT SHALL BE ZRC COLD GALVANIZING COMPOUND AS MANUFACTURED BY ZRC WORLDWIDE OR APPROVED EQUAL. INSTALL PER MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS.

GRANT J. OKUNAGA
LICENSED PROFESSIONAL ENGINEER
No. 13001-S
HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
EXP. 4-30-28
MKE ASSOCIATES LLC

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

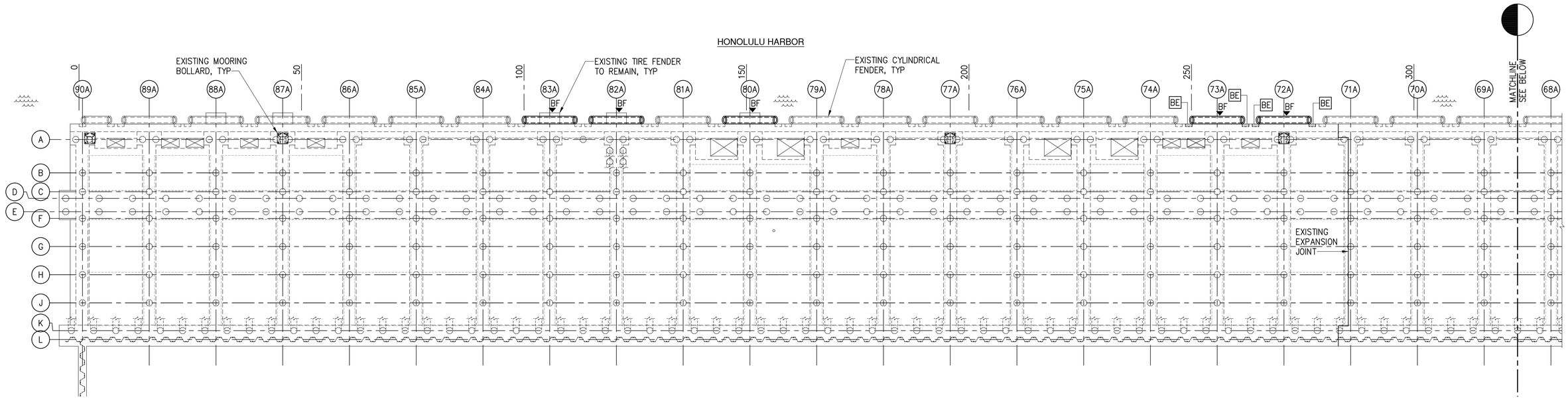
SHEET TITLE
STRUCTURAL NOTES

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-1
3 OF 18 SHTS.

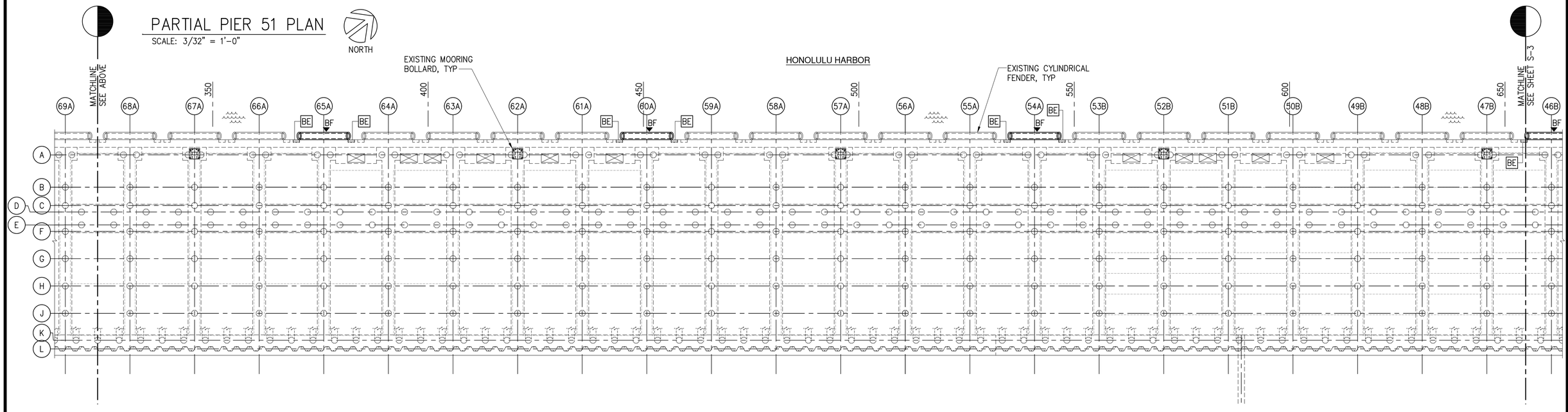
Plotted May 04, 2026 - 12:00pm



PARTIAL PIER 51 PLAN

SCALE: 3/32" = 1'-0"

NORTH



PARTIAL PIER 51 PLAN

SCALE: 3/32" = 1'-0"

NORTH

SPALL REPAIR LEGEND:

DAMAGED OR MISSING TOP (TF) AND/OR BOTTOM (BF) CYLINDRICAL FENDER, SEE SHEET S-12

BOTTOM EYE BOLT (BE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 3/S-13

REVISION	DATE	DESCRIPTION	BY	APPROVED

GRANT J. OKUNAGA
LICENSED PROFESSIONAL ENGINEER
No. 13001-S
HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
EXP: 4-30-28
MKE ASSOCIATES LLC

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

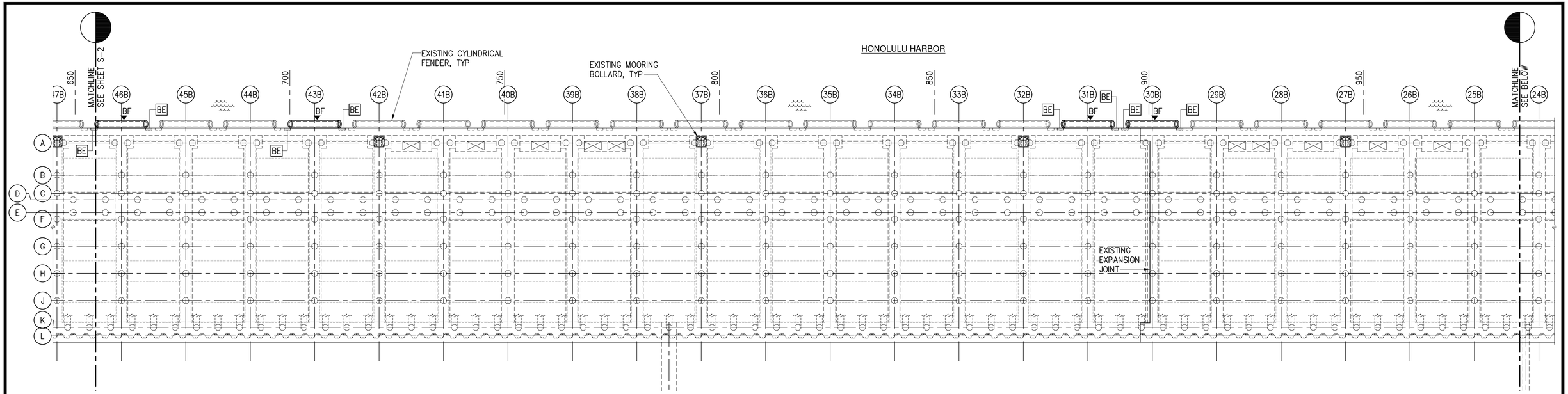
SHEET TITLE
PARTIAL PIER 51 PLAN

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-2
4 OF 18 SHTS.

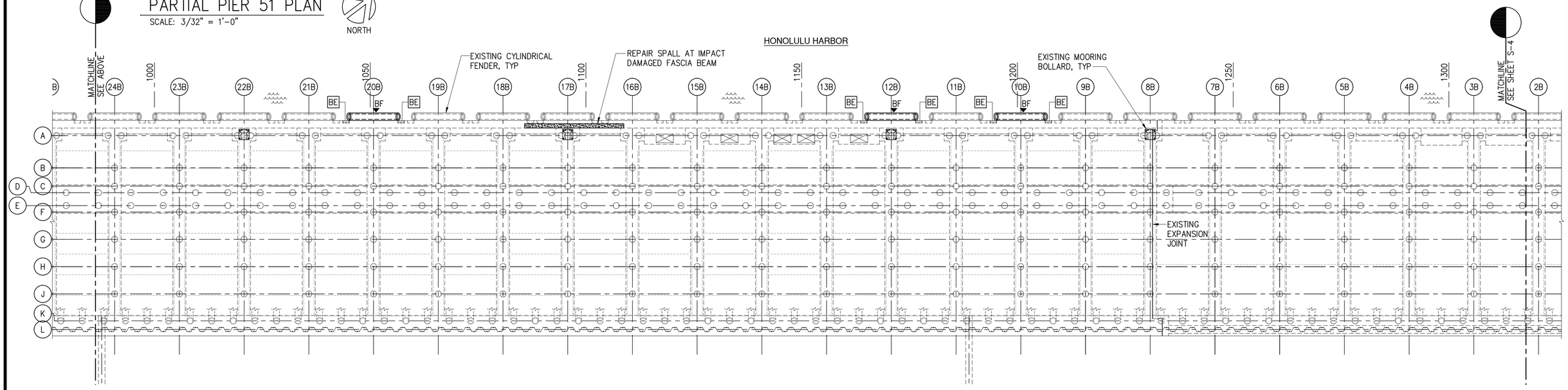
Plotted: May 07, 2026 - 12:50pm



PARTIAL PIER 51 PLAN

SCALE: 3/32" = 1'-0"

NORTH



PARTIAL PIER 51 PLAN

SCALE: 3/32" = 1'-0"

NORTH

SPALL REPAIR LEGEND:

- DAMAGED OR MISSING TOP (TF) AND/OR BOTTOM (BF) CYLINDRICAL FENDER, SEE SHEET S-12
- BOTTOM EYE BOLT (BE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 3/S-13
- BEAM SPALL, SEE DETAIL 1/S-15

REVISION	DATE	DESCRIPTION	BY	APPROVED

GRANT J. OKUNAGA
LICENSED PROFESSIONAL ENGINEER
No. 13001-S
HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
EXP. 4-30-28
MKE ASSOCIATES LLC

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

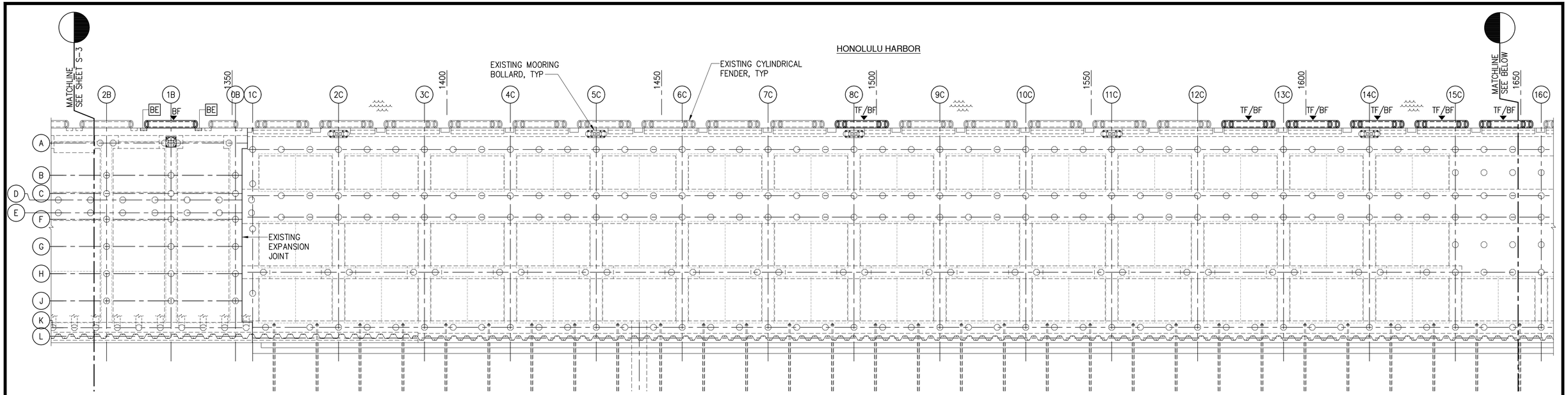
SHEET TITLE
PARTIAL PIER 51 PLAN

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-3
5 OF 18 SHTS.

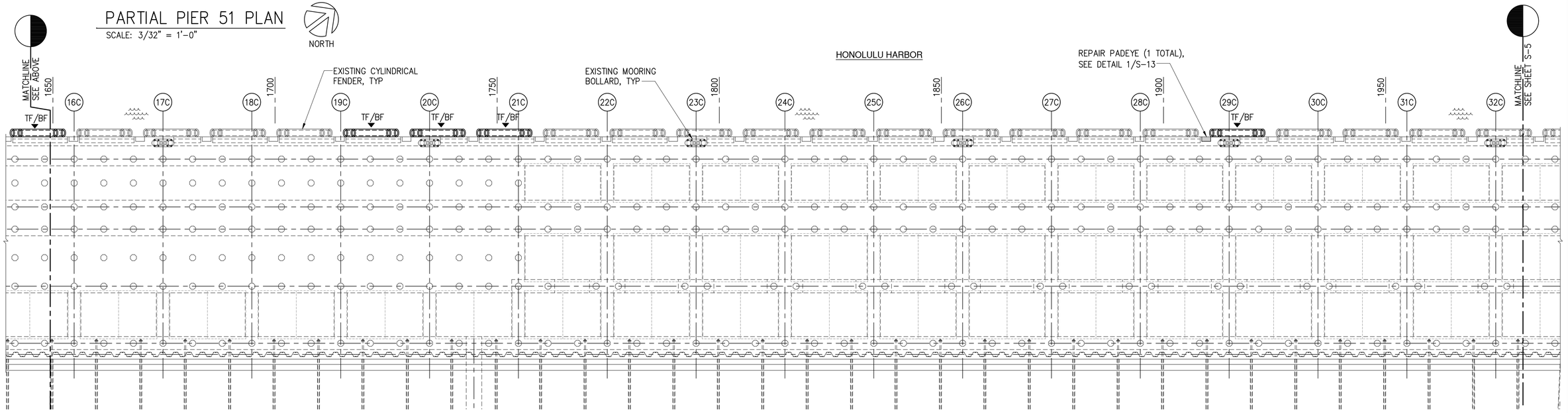
Plotted: May 07, 2026 - 12:07pm



PARTIAL PIER 51 PLAN

SCALE: 3/32" = 1'-0"

NORTH



PARTIAL PIER 51 PLAN

SCALE: 3/32" = 1'-0"

NORTH

SPALL REPAIR LEGEND:

DAMAGED OR MISSING TOP (TF) AND/OR BOTTOM (BF) CYLINDRICAL FENDER, SEE SHEET S-12

BOTTOM EYE BOLT (BE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 3/S-13

GRANT J. OKUNAGA
LICENSED PROFESSIONAL ENGINEER
No. 13001-S
HAWAII U.S.A.

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EXP. 4-30-28
MKE ASSOCIATES LLC

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51-53,
FENDER REPAIRS, OAHU, HAWAII

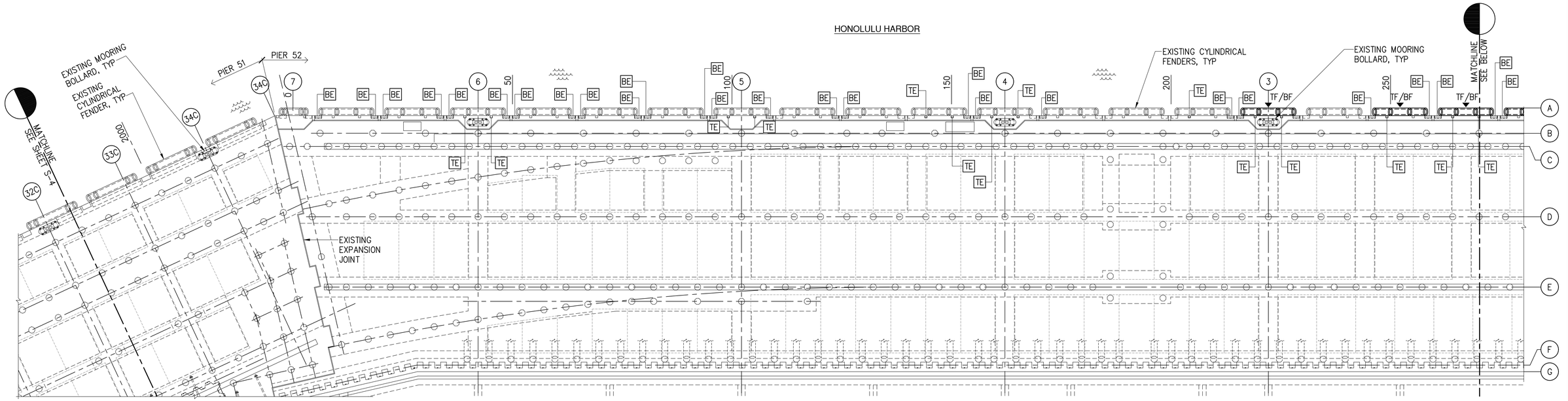
SHEET TITLE
PARTIAL PIER 51 PLAN

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-4
6 OF 18 SHTS.

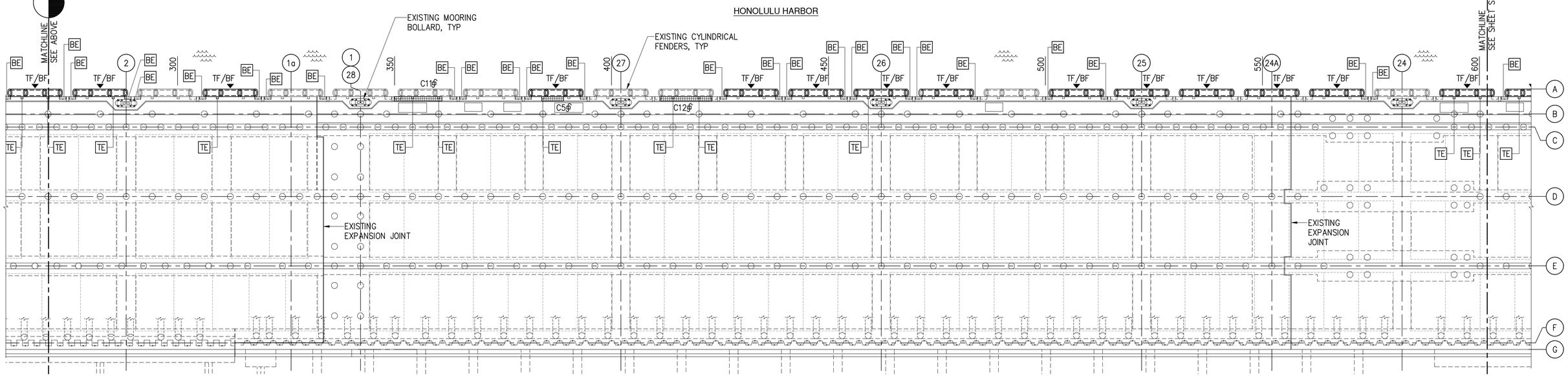
Plotted: May 07, 2026 - 10:07pm



PARTIAL PIER 51–52 PLAN

SCALE: 3/32" = 1'-0"

NORTH



PARTIAL PIER 52 PLAN

SCALE: 3/32" = 1'-0"

NORTH

SPALL REPAIR LEGEND:

DAMAGED OR MISSING TOP (TF) AND/OR BOTTOM (BF) CYLINDRICAL FENDER, SEE SHEET S-12

TOP EYE BOLT (TE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 2/S-13

BOTTOM EYE BOLT (BE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 3/S-13

GRANT J. OKUNAGA LICENSED PROFESSIONAL ENGINEER No. 13001-S HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
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MKE ASSOCIATES LLC

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51–53, FENDER REPAIRS, OAHU, HAWAII

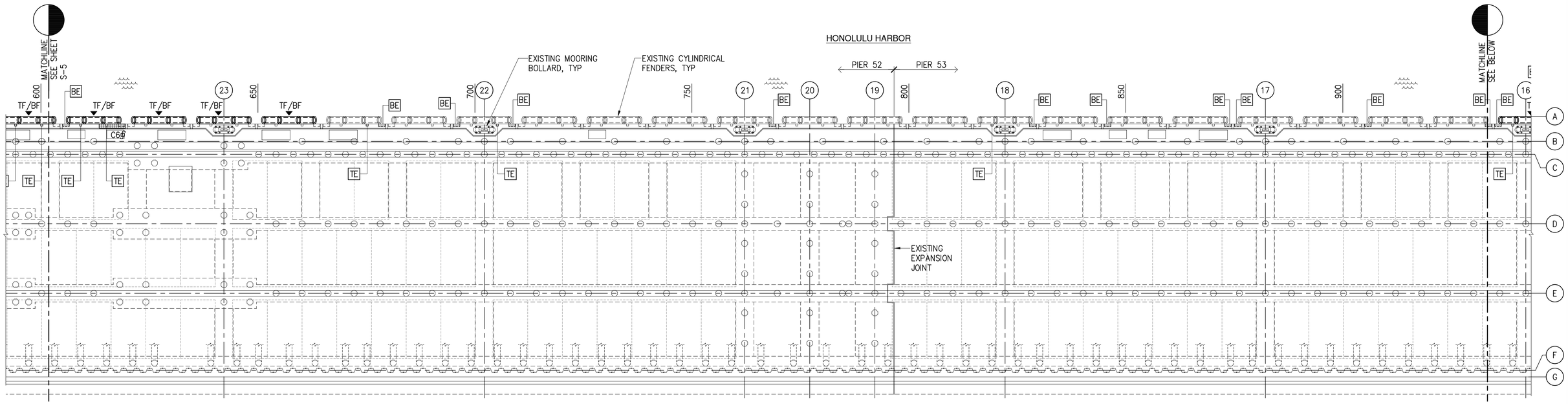
SHEET TITLE
PARTIAL PIER 51 AND 52 PLANS

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-5
7 OF 18 SHTS.

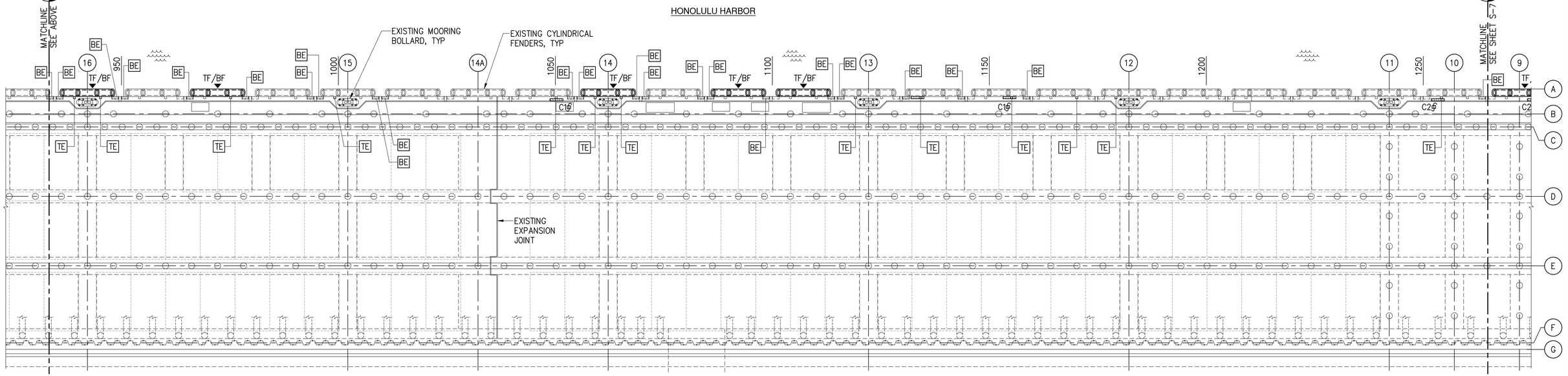
Plotted: May 07, 2026 - 12:00pm



PARTIAL PIER 52–53 PLAN

SCALE: 3/32" = 1'–0"

NORTH



PARTIAL PIER 53 PLAN

SCALE: 3/32" = 1'–0"

NORTH

SPALL REPAIR LEGEND:

- DAMAGED OR MISSING TOP (TF) AND/OR BOTTOM (BF) CYLINDRICAL FENDER, SEE SHEET S–12
- TOP EYE BOLT (TE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 2/S–13
- BOTTOM EYE BOLT (BE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 3/S–13
- CURB SPALL REPAIR (C) OR VERTICAL SPALL REPAIR (V), SEE DETAILS 1/S–14, 2/S–14 AND 3/S–14

GRANT J. OKUNAGA
LICENSED PROFESSIONAL ENGINEER
No. 13001–S
HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
EXP: 4–30–28

MKE ASSOCIATES LLC

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51–53, FENDER REPAIRS, OAHU, HAWAII

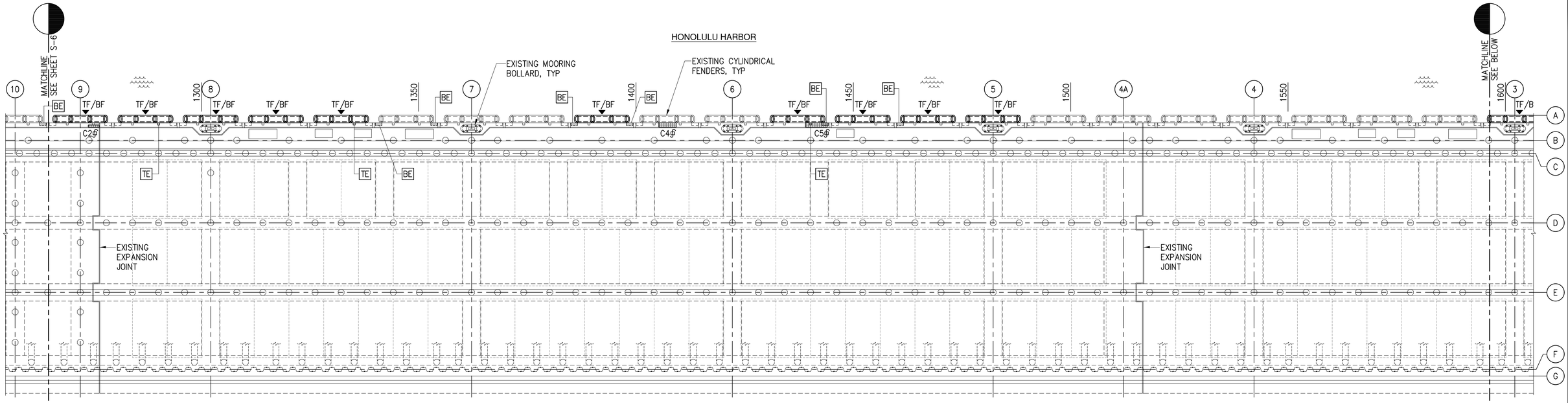
SHEET TITLE
PARTIAL PIER 52 AND 53 PLANS

DESIGNED BY:	AN
DRAWN BY:	DL
CHECKED BY:	GO
DATE:	05/2026
SCALE:	AS SHOWN

JOB NUMBER
S10954

SHEET
S-6
8 OF 18 SHTS.

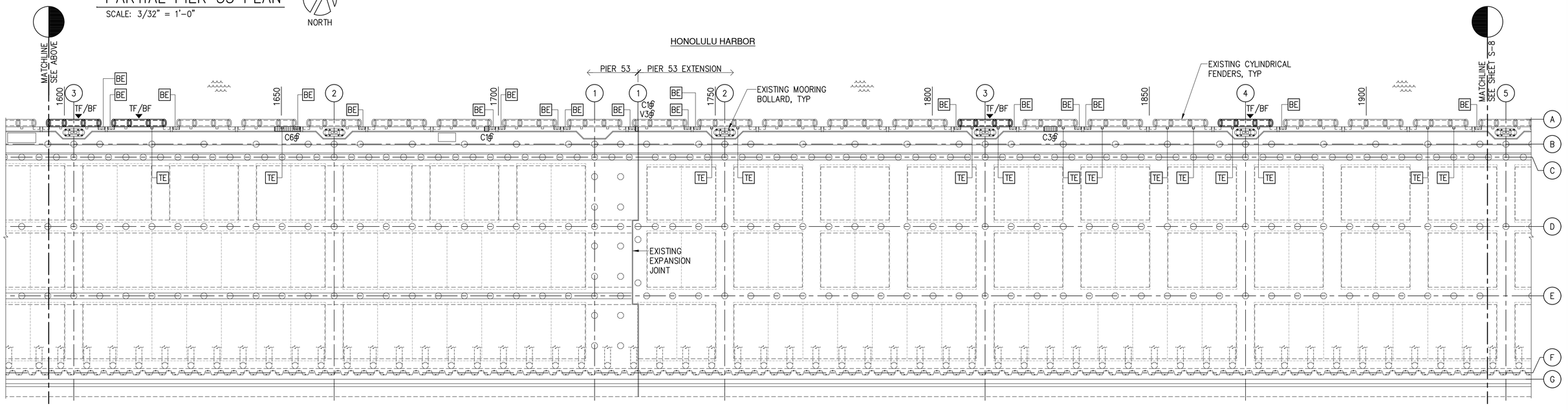
Plotted: May 07, 2026 - 12:00pm



PARTIAL PIER 53 PLAN

SCALE: 3/32" = 1'-0"

NORTH



PARTIAL PIER 53 PLAN

SCALE: 3/32" = 1'-0"

NORTH

SPALL REPAIR LEGEND:

- DAMAGED OR MISSING TOP (TF) AND/OR BOTTOM (BF) CYLINDRICAL FENDER, SEE SHEET S-12
- TOP EYE BOLT (TE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 2/S-13
- BOTTOM EYE BOLT (BE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 3/S-13
- CURB SPALL REPAIR (C) OR VERTICAL SPALL REPAIR (V), SEE DETAILS 1/S-14, 2/S-14 AND 3/S-14

REVISION	DATE	DESCRIPTION	BY	APPROVED

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

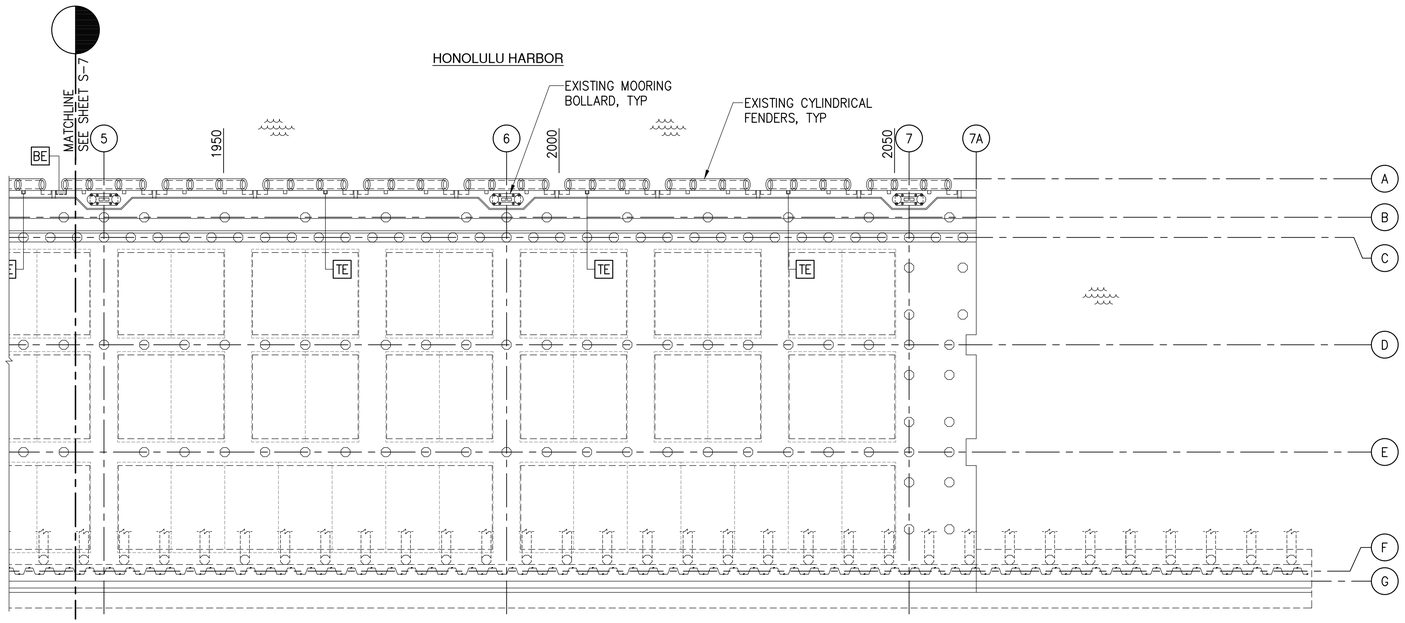
SHEET TITLE
PARTIAL PIER 53 PLAN

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-7
9 OF 18 SHTS.

Plotted: May 07, 2026 - 12:02pm



PARTIAL PIER 53 PLAN

SCALE: 3/32" = 1'-0"

NORTH

SPALL REPAIR LEGEND:

- DAMAGED OR MISSING TOP (TF) AND/OR BOTTOM (BF) CYLINDRICAL FENDER, SEE SHEET S-12
- TOP EYE BOLT (TE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 2/S-13
- BOTTOM EYE BOLT (BE) DAMAGED, SEVERELY CORRODED, OR MISSING, SEE DETAIL 3/S-13
- CURB SPALL REPAIR (C) OR VERTICAL SPALL REPAIR (V), SEE DETAILS 1/S-14, 2/S-14 AND 3/S-14

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STATE OF HAWAII
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HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

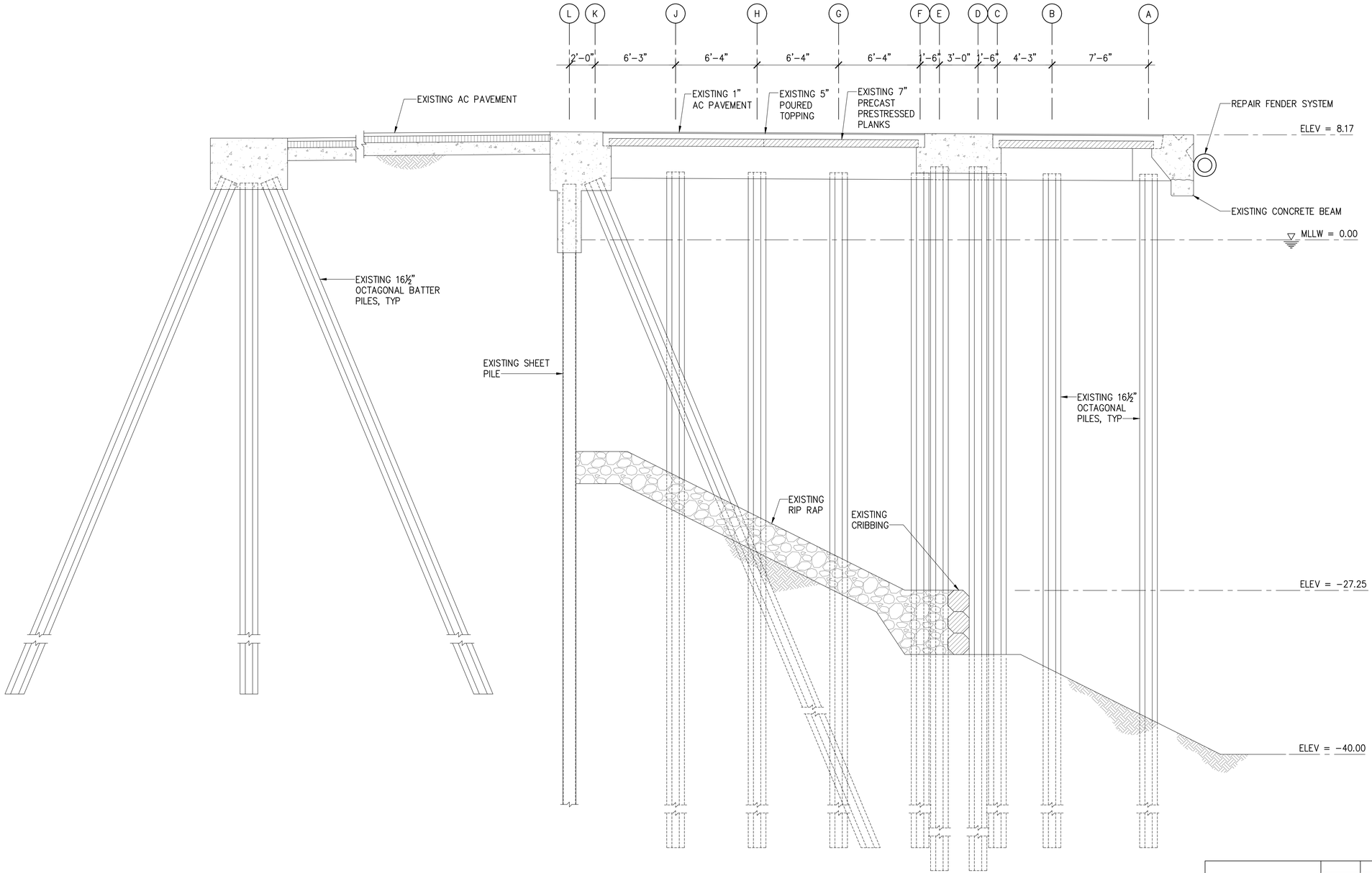
SHEET TITLE
PARTIAL PIER 53 PLAN

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-8
10 OF 18 SHTS.

Plotted: May 07, 2026 - 12:00pm



1 / S-9 TYPICAL SECTION AT PIER 51

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

Plotted: May 07, 2026 - 10:10pm

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JOB TITLE
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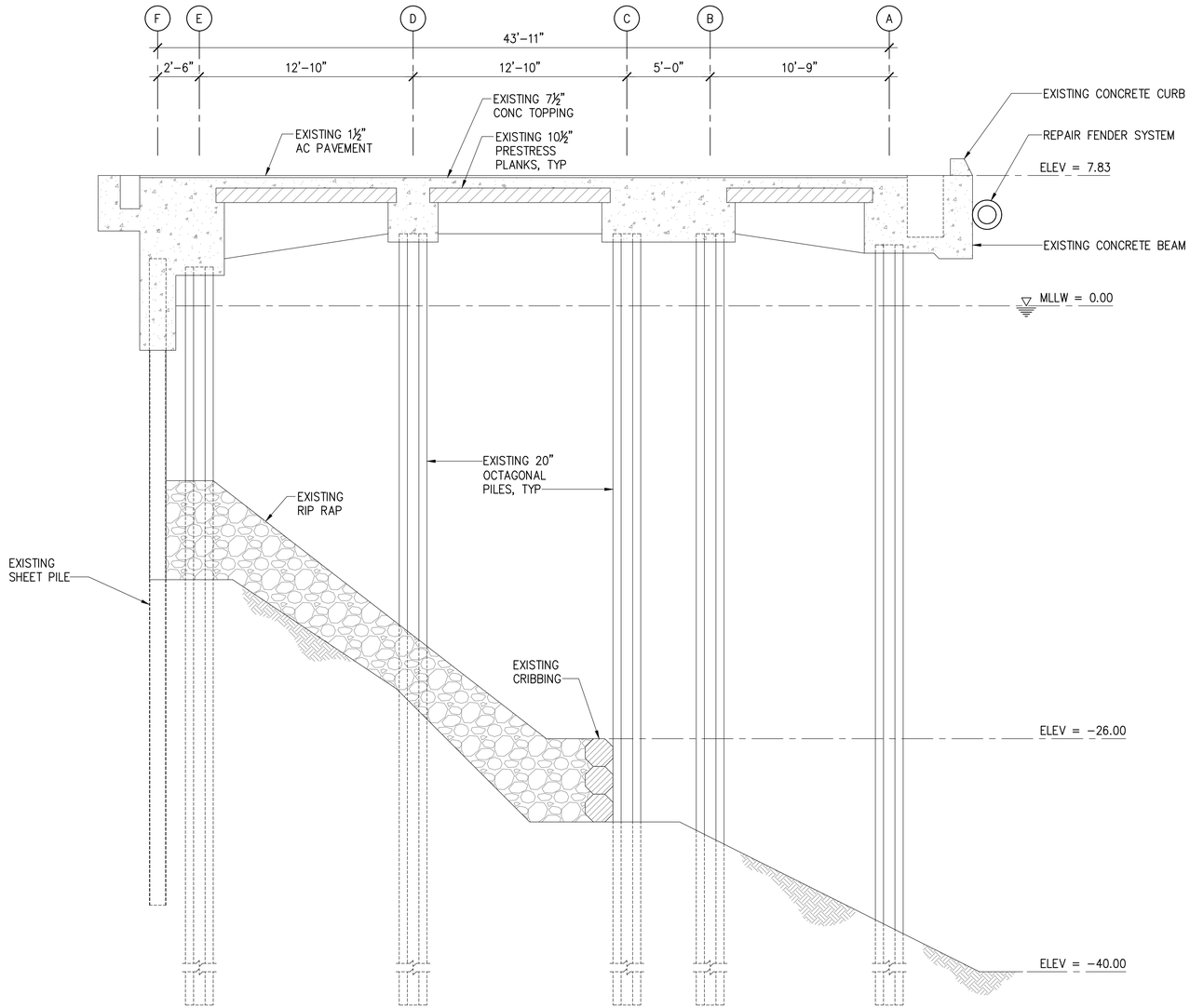
SHEET TITLE
TYPICAL PIER 51 SECTION

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-9
11 OF 18 SHTS.



1
S–10

TYPICAL SECTION AT PIER 51C

SCALE: 1/4" = 1'–0"

Plotted: May 07, 2026 - 12:11pm

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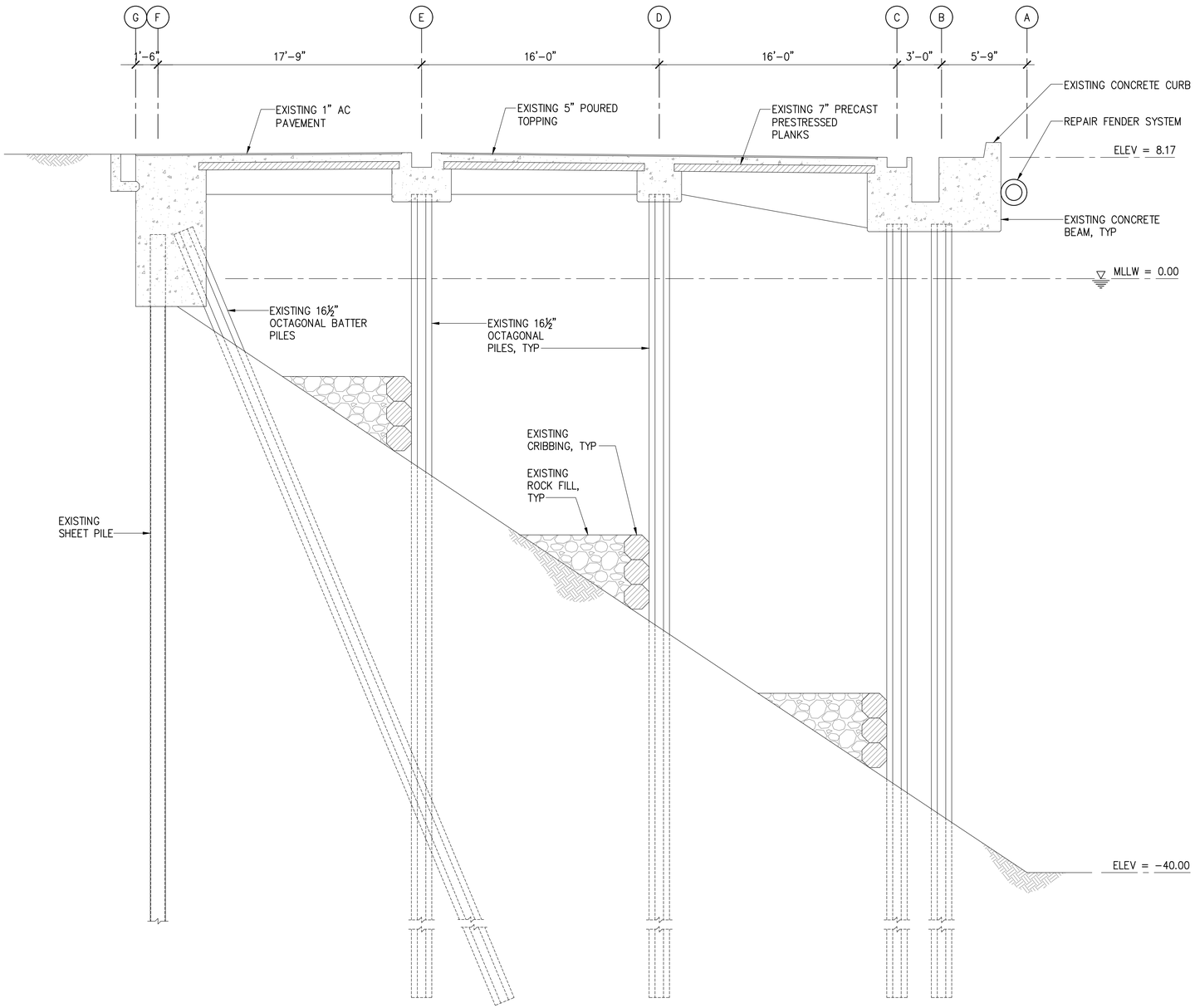
SHEET TITLE
TYPICAL PIER 51C SECTION

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-10
12 OF 18 SHTS.



NOTE:

PIER 53 EXTENSION CONSTRUCTION IS SIMILAR TO THE SECTION SHOWN ABOVE.

1 / S-11 TYPICAL SECTION AT PIER 52 AND 53

SCALE: 1/2" = 1'-0"

Plotted: May 07, 2026 - 12:31pm

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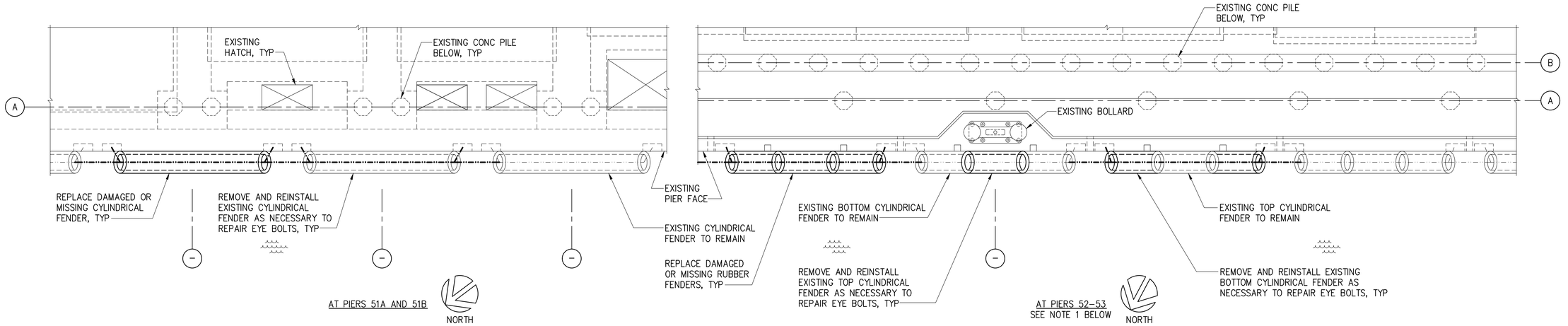
JOB TITLE
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

SHEET TITLE
PIER 52 AND 53 SECTION

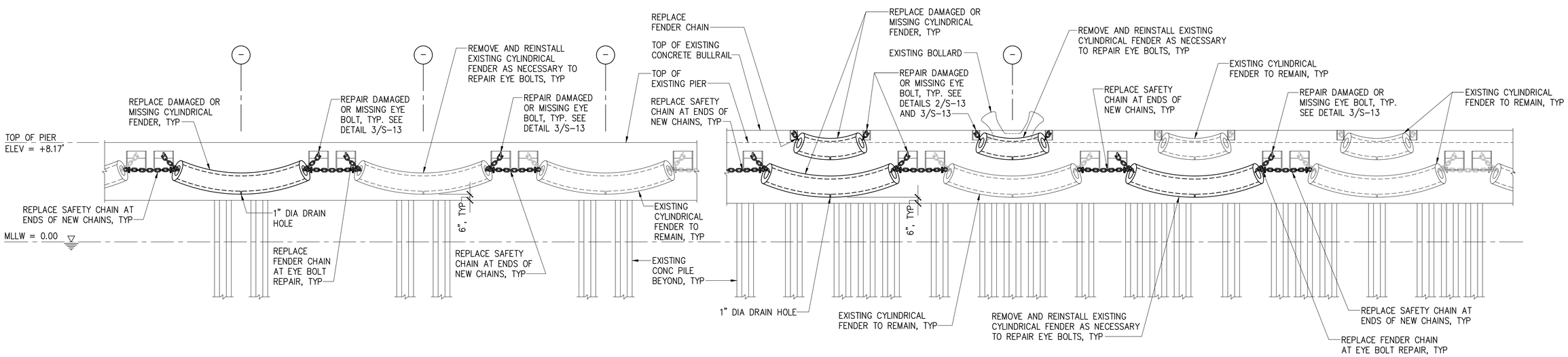
DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

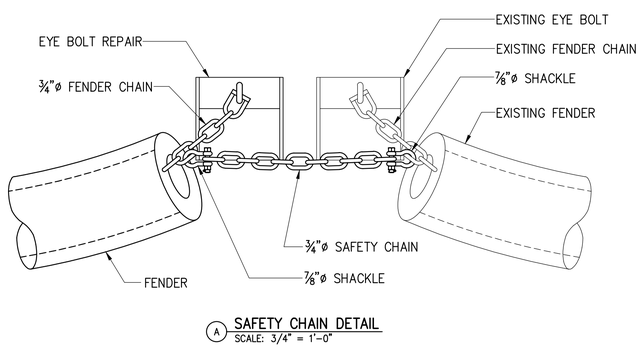
SHEET
S-11
13 OF 18 SHTS.



PLAN



ELEVATION



A SAFETY CHAIN DETAIL
SCALE: 3/4" = 1'–0"

NOTES:

1. PIER 51C IS SIMILAR TO PIERS 52 AND 53 EXCEPT WITH STRUCTURAL STEEL PAD EYES INSTEAD OF EYE BOLTS.
2. TYPICAL REPLACEMENT FENDER SIZES SHALL BE AS FOLLOWS:
   PIER 51A/B: 21" O.D. x 10–1/2" I.D. x 12–0"
   PIER 51C: 21" O.D. x 10–1/2" I.D. x 9'–0" (TOP) AND 12'–0"± (BOTTOM)
   PIER 52/53: 21" O.D. x 10–1/2" I.D. x 5'–0" (TOP) AND 12–0" (BOTTOM)
3. CONTRACTOR SHALL FIELD VERIFY EXISTING FENDER DIMENSIONS PRIOR TO ORDERING FENDERS.
4. UPPER RUBBER FENDER SHALL BE CONCENTRIC WITH LOWER RUBBER FENDER.
5. SEE PLANS FOR LOCATIONS OF FENDERS AND EYE BOLTS TO BE REPLACED.
6. CONTRACTOR SHALL REPLACE CHAINS AND HARDWARE AT BOTH NEW FENDERS AND REINSTALLED EXISTING FENDERS.

1/S–9 FENDER REPAIRS
SCALE: 1/4" = 1'–0"

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HAWAII U.S.A.

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EXP. 4–30–28
MKE ASSOCIATES LLC

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51–53, FENDER REPAIRS, OAHU, HAWAII

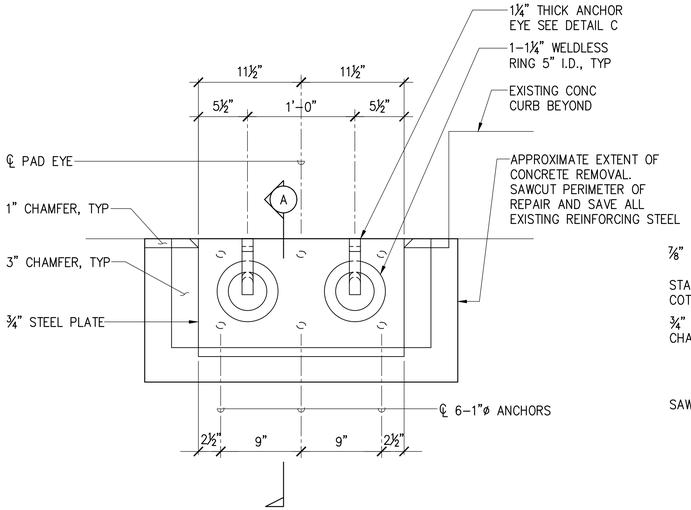
SHEET TITLE
FENDER REPAIR DETAILS

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

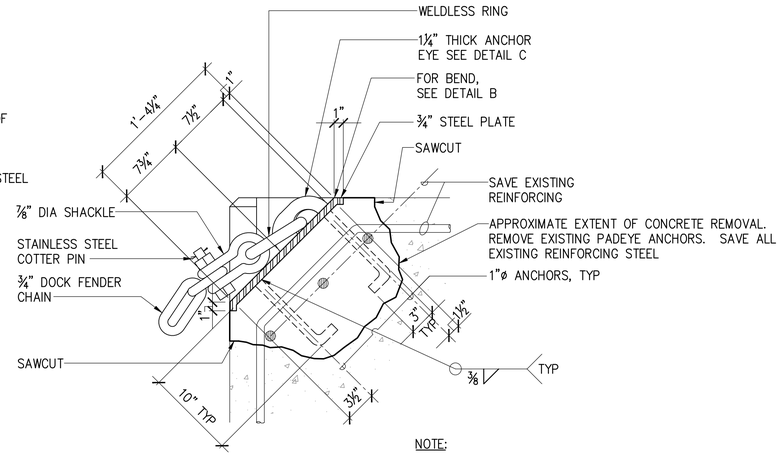
JOB NUMBER
S10954

SHEET
S-12
14 OF 18 SHTS.

Plotted May 04, 2026, 1:21pm



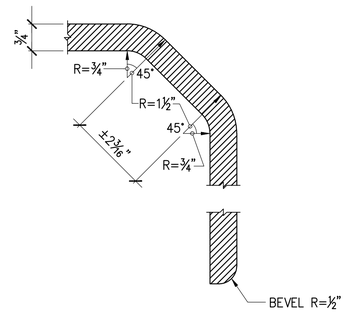
ELEVATION VIEW



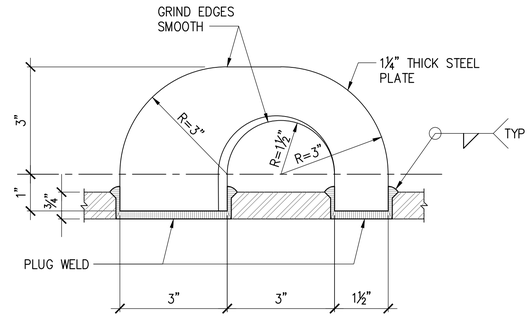
NOTE:

EXISTING PADEYE ANCHORS SIMILAR TO REPLACEMENT PAD EYE ANCHORS.

A SECTION

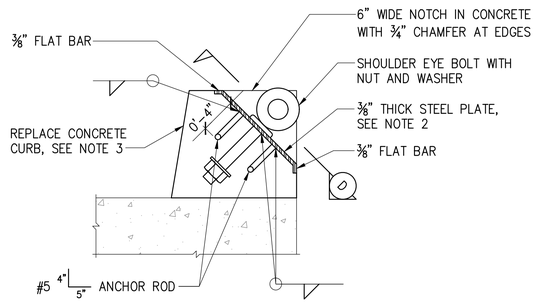


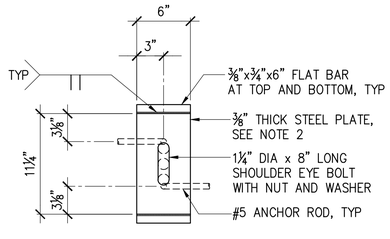
B BEND DETAIL
SCALE: 6" = 1'–0"



C EYE DETAIL
SCALE: 6" = 1'–0"

1 S–13 PAD EYE REPAIR DETAIL
SCALE: 1–1/2" = 1'–0"



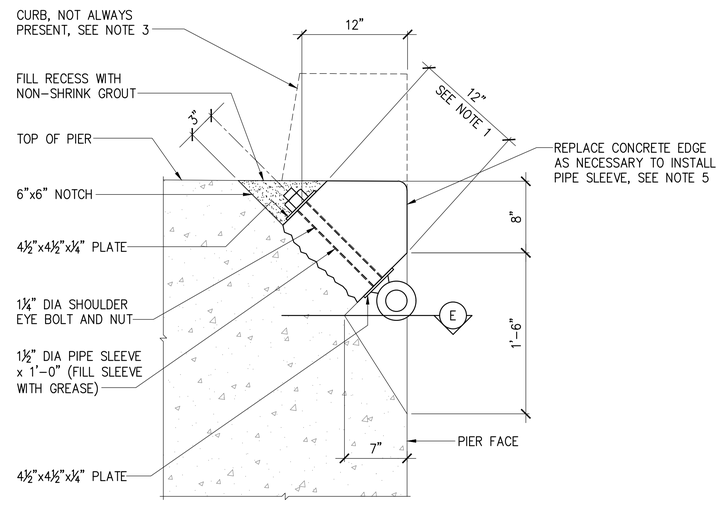


D SECTION

NOTES:

1. EYE BOLT ASSEMBLY SHALL BE HOT–DIPPED GALVANIZED AFTER FABRICATION.
2. A BENT STEEL PLATE MAY BE SUBSTITUTED FOR WELDED FLAT BARS AT TOP AND BOTTOM.
3. CONCRETE CURB SHALL BE REPLACED AS NECESSARY TO INSTALL EYE BOLT ASSEMBLY. A LENGTH OF 1'–0" OF CURB SHALL BE INCLUDED IN THE PAYMENT ITEM FOR EACH TOP EYE BOLT REPAIR.
4. EXISTING CURB REINFORCING STEEL VARIES AND NOT SHOWN FOR CLARITY.

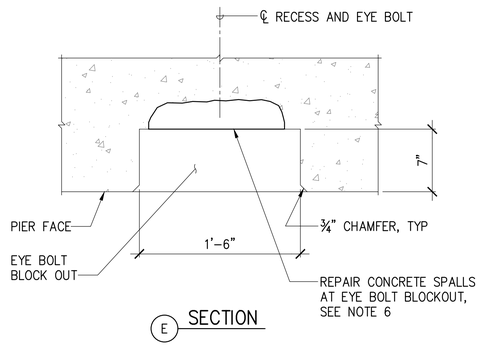
2 S–13 TOP EYE BOLT REPAIR DETAIL
SCALE: 1–1/2" = 1'–0"



NOTES:

1. CONDITION AT PIER 51A AND 51B SHOWN.
2. PIPE SLEEVE LENGTH IS 11" AT PIERS 52 AND 53.
3. CONCRETE CURB IS PRESENT AT PIERS 52 AND 53.
4. EYEBOLT AND ALL HARDWARE SHALL BE HOT–DIPPED GALVANIZED AFTER FABRICATION.
5. CONCRETE SPALLS AT EYE BOLT BLOCKOUT SHALL BE PAID FOR AND REPAIRED PER DETAIL 2/S–12.
6. CONCRETE EDGE SHALL BE REPLACED AS NECESSARY TO INSTALL EYE BOLT ASSEMBLY. A LENGTH OF 1'–0" SHALL BE INCLUDED IN THE PAYMENT ITEM FOR EACH BOTTOM EYE BOLT REPAIR.

3 S–13 BOTTOM EYE BOLT REPAIR DETAIL
SCALE: 1–1/2" = 1'–0"



E SECTION

GRANT J. OKUNAGA LICENSED PROFESSIONAL ENGINEER No. 13001–S HAWAII U.S.A.

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EXP. 4–30–28
MKE ASSOCIATES LLC

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51–53, FENDER REPAIRS, OAHU, HAWAII

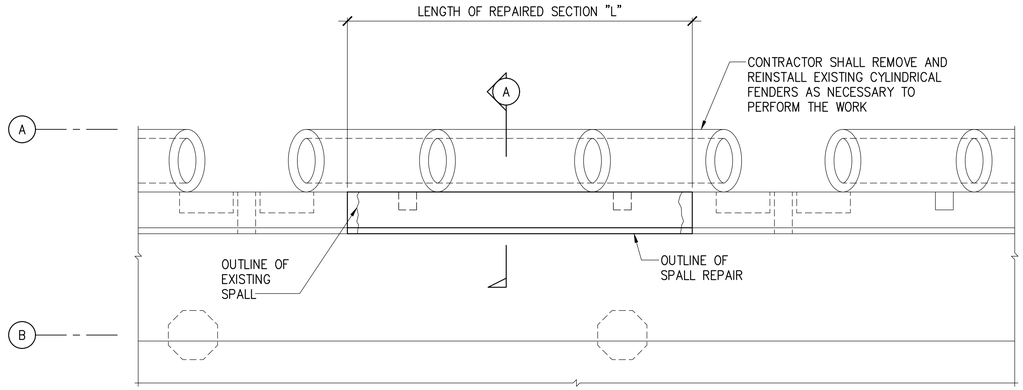
SHEET TITLE
FENDER REPAIR DETAILS

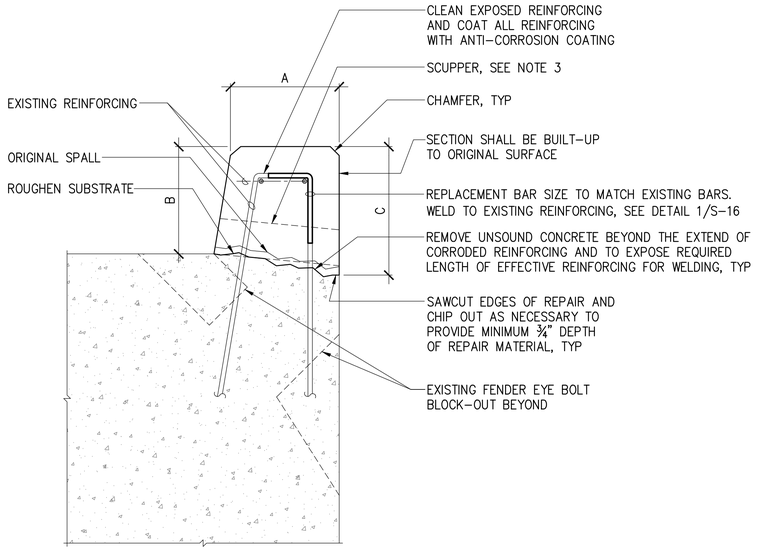
DESIGNED BY:	AN
DRAWN BY:	DL
CHECKED BY:	GO
DATE:	05/2026
SCALE:	AS SHOWN

JOB NUMBER
S10954

SHEET
S-13
15 OF 18 SHTS.

Plotted May 04, 2026 - 12:22pm





A SECTION
SCALE: 1-1/2" = 1'-0"

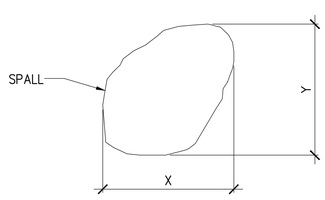
PAY AREA:
A = WIDTH OF REPAIR
B = HEIGHT OF REPAIR (INBOARD FACE)
C = HEIGHT OF REPAIR (OUTBOARD FACE)
L = LENGTH OF REPAIR

PAY AREA = (A+B+C) x L

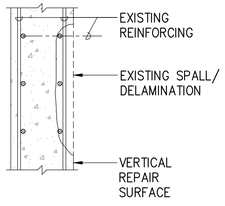
NOTES:

1. PAY AREA SHALL BE THE TOTAL REPAIRED AREA ON ALL CURB FACES. IF A, B, OR C VARY ALONG THE LENGTH OF THE REPAIR, PAY AREA SHALL BE CALCULATED INDIVIDUALLY FOR EACH CURB FACE.
2. EXISTING FENDERS NOT SHOWN FOR CLARITY.
3. MAINTAIN EXISTING SCUPPERS WHEN PRESENT. SCUPPERS ARE TYPICALLY 4" HIGH x 6" WIDE AT ±15'-0" SPACING.

1 / S-14 CURB SPALL REPAIR (C)
SCALE: 1/2" = 1'-0"



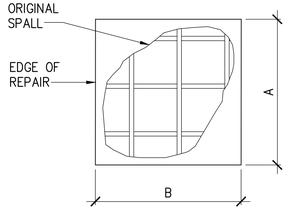
ELEVATION



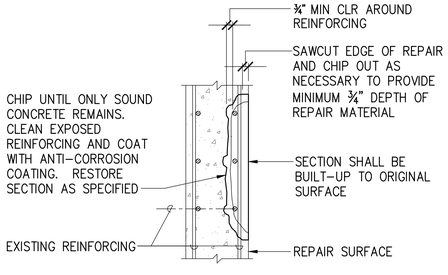
SECTION

EXISTING SPALL AREA = X x Y

EXISTING CONDITION



ELEVATION



SECTION

PAY AREA = A x B

REPAIRED CONDITION

2 / S-14 VERTICAL SPALL REPAIR (V)
NOT TO SCALE

REVISION	DATE	DESCRIPTION	BY	APPROVED

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HAWAII U.S.A.

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EXP. 4-30-28
MKE ASSOCIATES LLC

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

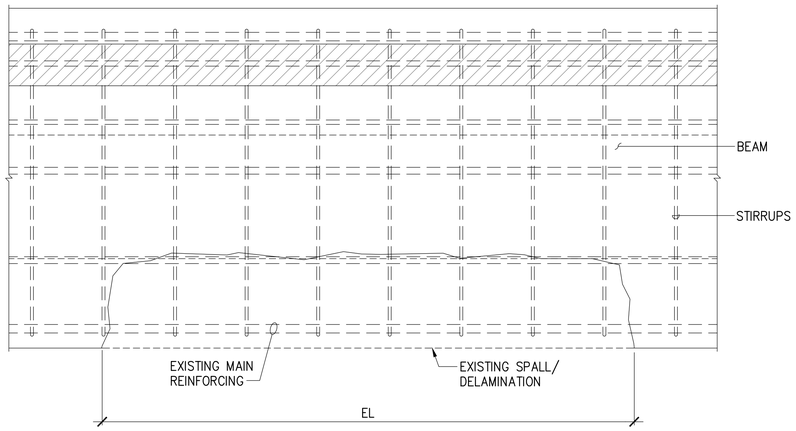
SHEET TITLE
CURB AND VERTICAL SPALL REPAIR DETAILS

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

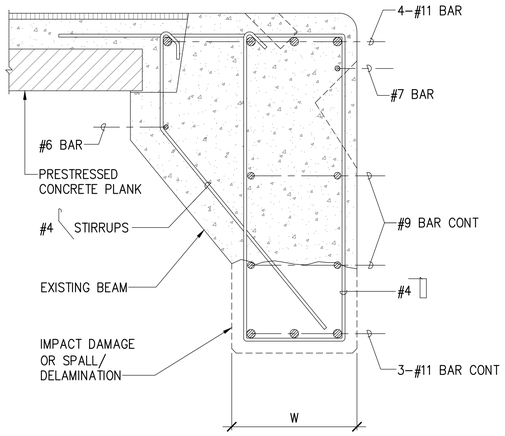
JOB NUMBER
S10954

SHEET
S-14
16 OF 18 SHTS.

Plotted May 07, 2026 - 12:42pm



BEAM ELEVATION



BEAM SECTION

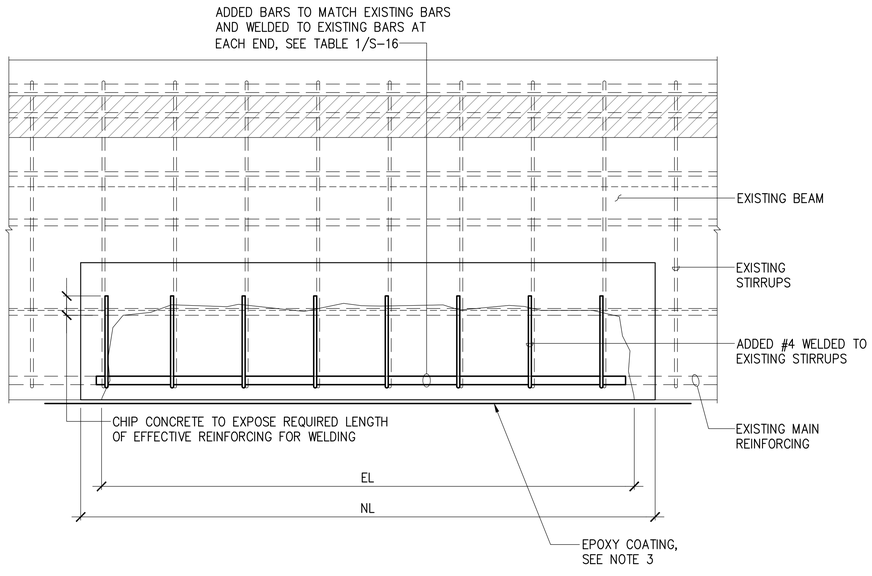
PAY AREA:
HL = HEIGHT OF REPAIR (LEFT SIDE)
HR = HEIGHT OF REPAIR (RIGHT SIDE)
W = ORIGINAL WIDTH OF BEAM/GIRDER SPALL
EL = EXISTING LENGTH OF SPALL
NL = LENGTH OF REPAIR

PAY AREA = (HL1+HL2+HR+W)NL

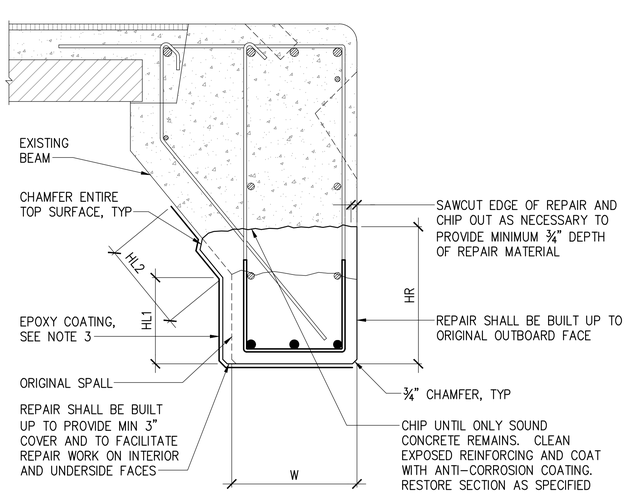
NOTES:

1. PAY AREA SHALL BE THE TOTAL REPAIRED AREA ON ALL BEAM FACES. IF HL1, HL2, HR OR W VARY ALONG THE LENGTH OF REPAIR, PAY AREA SHALL BE CALCULATED INDIVIDUALLY FOR EACH BEAM FACE.
2. ALL SEVERELY BENT REINFORCING STEEL SHALL BE REPLACED. SLIGHTLY BENT REINFORCING STEEL MAY EITHER BE REPLACED OR BENT BACK INTO PLACE.
3. APPLY EPOXY COATING OVER REPAIRS. OVERLAP 6" MIN. OVER EXISTING EPOXY COATING.
4. FENDER SYSTEM NOT SHOWN FOR CLARITY.

EXISTING CONDITION



BEAM ELEVATION



BEAM SECTION

REPAIRED CONDITION

1 / S–15 BEAM SPALL REPAIR (TYPE B REPAIR)
NOT TO SCALE

REVISION	DATE	DESCRIPTION	BY	APPROVED

GRANT J. OKUNAGA LICENSED PROFESSIONAL ENGINEER No. 13001–S HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
EXP. 4–30–28
MKE ASSOCIATES LLC

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51–53, FENDER REPAIRS, OAHU, HAWAII

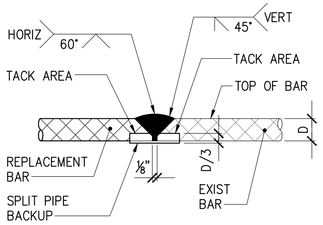
SHEET TITLE
BEAM SPALL REPAIR DETAILS

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER S10954

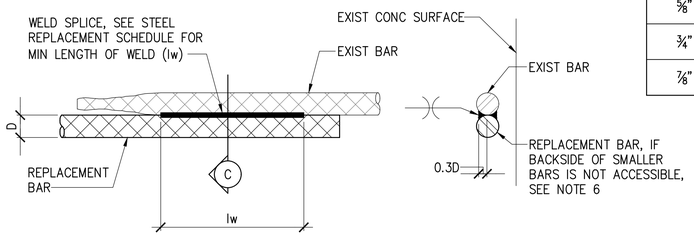
SHEET S-15
17 OF 18 SHTS.

Plotted: May 07 2026 - 13:29pm



A BUTT SPLICE

USE DETAIL A FOR #7 BARS AND LARGER



NOTE:
lw = LENGTH OF WELD EACH SIDE
(SEE STEEL REPLACEMENT SCHEDULE)

B LAP SPLICE

C SECTION

USE DETAIL B FOR #6 BARS AND SMALLER

1 / S-16 REINFORCING STEEL SPLICE DETAIL
NOT TO SCALE

REINFORCING STEEL WELDING NOTES:

1. CHIP, GRIND, OR GOUGE TO SOUND METAL BEFORE WELDING.
2. CLEAN EXIST REBAR AND PREPARE ACCORDING TO SPECIFICATIONS. APPLY COATING AFTER WELDING.
3. SEE STEEL REPLACEMENT SCHEDULE BELOW FOR REPLACEMENT BAR SIZE.
4. USE E70 ELECTRODES.
5. SEE AWS D1.4 FOR WELDING PROCESS AND OTHER DETAILS.
6. FOR WELDING OF #3, #4, AND #5 REPLACEMENT REINFORCING, WELDING MAY BE PERFORMED ON ONE SIDE ONLY, IF lw IS INCREASED TO lw1 AS FOLLOWS

STEEL REPLACEMENT SCHEDULE

SIZE OF EXISTING REINFORCING		SIZE OF REPLACEMENT REINFORCING	MINIMUM LENGTH OF WELD EACH SIDE (lw)	MINIMUM LENGTH OF WELD ONE SIDE lw1
SQUARE	ROUND			
⅜"	#3, #4	#4	2"	4"
½"	#5	#5	2½"	5"
⅝"	#6	#6	3½"	–
¾"	#7	#7	–	–
⅞"	#8	#8	–	–

GRANT J. OKUNAGA
LICENSED PROFESSIONAL ENGINEER
No. 13001-S
HAWAII U.S.A.

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REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS

JOB TITLE
HONOLULU HARBOR, PIERS 51-53, FENDER REPAIRS, OAHU, HAWAII

SHEET TITLE
SPLICE DETAIL

DESIGNED BY: AN
DRAWN BY: DL
CHECKED BY: GO
DATE: 05/2026
SCALE: AS SHOWN

JOB NUMBER
S10954

SHEET
S-16
18 OF 18 SHTS.

Plotted: May 07, 2026 - 12:23pm