



THE CITY OF WINNIPEG

TENDER

TENDER NO. 391-2021

**SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER
REFURBISHMENT WORKS**

TABLE OF CONTENTS

PART A - BID SUBMISSION

- Form A: Bid/Proposal
- Form B: Prices
- Form G1: Bid Bond and Agreement to Bond

PART B - BIDDING PROCEDURES

B1. Contract Title	1
B2. Submission Deadline	1
B3. Site Investigation	1
B4. Enquiries	1
B5. Confidentiality	2
B6. Addenda	2
B7. Substitutes	2
B8. Bid Components	3
B9. Bid	4
B10. Prices	4
B11. Disclosure	5
B12. Conflict of Interest and Good Faith	5
B13. Qualification	6
B14. Bid Security	7
B15. Opening of Bids and Release of Information	8
B16. Irrevocable Bid	8
B17. Withdrawal of Bids	8
B18. Evaluation of Bids	8
B19. Award of Contract	9

PART C - GENERAL CONDITIONS

C0. General Conditions	1
------------------------	---

PART D - SUPPLEMENTAL CONDITIONS

General

D1. General Conditions	1
D2. Form of Contract Documents	1
D3. Scope of Work	1
D4. Definitions	1
D5. Contract Administrator	3
D6. Contractor's Supervisor	3
D7. Notices	3
D8. Furnishing of Documents	3
D9. Cooperation with Others	3

Submissions

D10. Authority to Carry on Business	4
D11. Safe Work Plan	4
D12. Insurance	4
D13. Contract Security	5
D14. Subcontractor List	6
D15. Detailed Work Schedule	6
D16. Quality Management Plan	7

Schedule of Work

D17. Commencement	8
D18. Restricted Work Hours	8
D19. Damage to Existing Structures and Property	8
D20. Work by Others	8
D21. Critical Stages	9
D22. Substantial Performance	9

D23. Total Performance	9
D24. Liquidated Damages	10
D25. COVID-19 Schedule Delays	10
Control of Work	
D26. Job Meetings	11
D27. Prime Contractor – The Workplace Safety and Health Act (Manitoba)	11
D28. The Workplace Safety and Health Act (Manitoba) – Qualifications	11
D29. Layout of Work	11
D30. Request for Information and Non-Conformance Reports	12
Measurement and Payment	
D31. Invoices	12
D32. Payment	12
D33. Payment Schedule	12
Warranty	
D34. Warranty	12
Third Party Agreements	
D35. Funding and/or Contribution Agreement Obligations	13
Form H1: Performance Bond	15
Form H2: Labour and Material Payment Bond	17
Form J: Subcontractor List	19
PART E - SPECIFICATIONS	
General	
E1. Applicable Specifications and Drawings	1
E2. Hazardous Materials	2
E3. Shop Drawings	2
E4. Additional Work	4
Appendix A	Walker Process Documentation
Appendix B	Inspection and Test Plan
Appendix C	Site Plan for Laydown Area
Appendix D	Construction Plan
Appendix E	Commissioning Plan
Appendix F	City Forms
Appendix G	Project Materials List
Appendix H	Environmental Management Policy
Appendix I	Testlabs Inspection Reports
Appendix J	Quality Control Checklists
Appendix K	Sample Documents

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 South End Sewage Treatment Plant (SEWPCC) Primary Clarifier Refurbishment Works

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 pm Winnipeg time, June 29, 2021.

B2.2 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. SITE INVESTIGATION

B3.1 Further to C3.1, the Contract Administrator or an authorized representative will be available at the Site at South End Sewage Treatment Plant (SEWPCC), located at 100 Ed Spencer Drive, Winnipeg, MB, on the following dates and times.

(a) June 15, 2021 at 1:00 pm; and

(b) June 17, 2021 at 9:00 am.

Investigations are **by** appointment only and for a maximum of three (3) attendees per Bidder to maintain current social distancing measures related to COVID-19 pandemic and wear a non-medical mask or face covering during the investigation.

B3.1.1 All Bidder attendees are required to review the City's latest revision of a COVID-19 Daily Self-Screening Questionnaire and respond in writing (i.e., mark 'yes' or 'no' to each question, print date and full name, sign questionnaire, and submit via email) to the Contract Administrator at least one (1) Business Day prior the site investigation. Failure to do so may result in the Bidder attendee being denied access to the Site Investigation. A copy of the questionnaire will be provided after booking an appointment with the Contract Administrator.

B3.1.2 The same information will be provided at both presentations of the Site Investigation.

B3.1.3 Bidders are requested to register to view the Site by contacting the Contract Administrator identified in D4 before June 14, 2021 at 4:00pm for site investigation time identified in B3.1(a), and before June 16, 2021 at 4:00pm for the site investigation time identified in B3.1(b).

B3.1.4 Bidders are requested to meet in front of the main entrance of the SEWPCC plant.

B3.1.5 Bidders attending the Site Investigation outlined in above are required to provide their own Personal Protective Equipment; at a minimum hard hat, CSA approved footwear, and safety glasses.

B3.2 Although attendance at the Site Investigations is not mandatory, the City strongly suggests that Bidders attend.

B3.3 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D5.1.

B4.2 If the Bidder finds errors, discrepancies or omissions in the Tender, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

- B4.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Tender will be provided by the Contract Administrator to all Bidders by issuing an addendum.
- B4.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Tender will be provided by the Contract Administrator only to the Bidder who made the enquiry.
- B4.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B4 unless that response or interpretation is provided by the Contract Administrator in writing.
- B4.6 Any enquiries concerning submitting through MERX should be addressed to:
MERX Customer Support
Phone: 1-800-964-6379
Email: merx@merx.com

B5. CONFIDENTIALITY

- B5.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:
- (a) was known to the Bidder before receipt hereof; or
 - (b) becomes publicly known other than through the Bidder; or
 - (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.
- B5.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Tender to the media or any member of the public without the prior written authorization of the Contract Administrator.

B6. ADDENDA

- B6.1 The Contract Administrator may, at any time prior to the Submission Deadline, issue addenda correcting errors, discrepancies or omissions in the Tender, or clarifying the meaning or intent of any provision therein.
- B6.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.
- B6.3 Addenda will be available on the on the MERX website at www.merx.com.
- B6.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the MERX website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B6.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid/Proposal. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.
- B6.6 Notwithstanding B4, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D5.

B7. SUBSTITUTES

- B7.1 The Work is based on the Plant, Materials and methods specified in the Tender.
- B7.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

- B7.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.
- B7.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
 - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
 - (c) identify any anticipated cost or time savings that may be associated with the substitute;
 - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;
 - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.
- B7.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B7.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.
- B7.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.
- B7.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B7.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B18.
- B7.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B8. BID COMPONENTS

- B8.1 The Bid shall consist of the following components:
- (a) Form A: Bid/Proposal;
 - (b) Form B: Prices;
 - (c) Form G1: Bid Bond and Agreement to Bond.
- B8.2 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely.

B8.3 The Bid shall be submitted electronically through MERX at www.merx.com

B8.3.1 Bids will **only** be accepted electronically through MERX.

B8.4 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B18.1(a).

B9. BID

B9.1 The Bidder shall complete Form A: Bid/Proposal, making all required entries.

B9.2 Paragraph 2 of Form A: Bid/Proposal shall be completed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;
- (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
- (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
- (d) if the Bidder is carrying on business under a name other than his/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

B9.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B9.2.

B9.3 In Paragraph 3 of Form A: Bid/Proposal, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B9.4 Paragraph 13 of Form A: Bid/Proposal shall be signed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;
- (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
- (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;
- (d) if the Bidder is carrying on business under a name other than his/her own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B9.4.1 The name and official capacity of all individuals signing Form A: Bid/Proposal should be entered below such signatures.

B9.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B10. PRICES

B10.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B10.1.1 Notwithstanding C12.2.3(c), prices on Form B: Prices shall not include the Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra where applicable.

B10.1.2 Prices stated on Form B: Prices shall not include any costs which may be incurred by the Contractor with respect to any applicable funding agreement obligations as outlined in D35. Any such costs shall be determined in accordance with D35.

- B10.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.
- B10.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.
- B10.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).
- B10.5 The Bidder shall enter the Total Bid Price from Form B: Prices into the Total Bid Price field in MERX.
- B10.5.1 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B11. DISCLOSURE

- B11.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.
- B11.2 The Persons are:
- (a) Walker Process Equipment: Repair parts and installation Info.
- B11.3 Additional Material:
- (a) Contract for Supply and Delivery of SEWPCC Primary Clarifier No. 1 & 2 Parts. Further details on the parts being supplied are outlined in Specification Section 14 00 01.

B12. CONFLICT OF INTEREST AND GOOD FAITH

- B12.1 Further to C3.2, Bidders, by responding to this Tender, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.
- B12.2 Conflict of Interest means any situation or circumstance where a Bidder or employee of the Bidder proposed for the Work has:
- (a) other commitments;
 - (b) relationships;
 - (c) financial interests; or
 - (d) involvement in ongoing litigation;
- that could or would be seen to:
- (i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or
 - (ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;
- (e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of its participation in the Tender process or the Work; or
 - (f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Tender process) of strategic and/or material relevance to the Tender process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.

- B12.3** In connection with its Bid, each entity identified in B12.2 shall:
- (a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;
 - (b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Tender process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and
 - (c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.
- B12.4** Without limiting B12.3, the City may, in its sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies, procedures, measures and other safeguards as may be required by and be acceptable to the City, in its sole discretion, to avoid or mitigate the impact of such Conflict of Interest.
- B12.5** Without limiting B12.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in its sole discretion:
- (a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its employees proposed for the Work;
 - (b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in its sole discretion, determines cannot be avoided or mitigated;
 - (c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B12.4 to avoid or mitigate a Conflict of Interest; and
 - (d) disqualify a Bidder if the Bidder, or one of its employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.
- B12.6** The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in its sole discretion.

B13. QUALIFICATION

- B13.1** The Bidder shall:
- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and
 - (b) be financially capable of carrying out the terms of the Contract; and
 - (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.
- B13.2** The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <https://www.winnipeg.ca/matmgt/Templates/files/debar.pdf>

- B13.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) have successfully carried out work similar in nature, scope and value to the Work; and
 - (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
 - (c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);
- B13.4 Further to B13.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:
- (a) Written confirmation of a safety and health certification meeting SAFE Work Manitoba's SAFE Work Certified Standard (e.g., COR™ and SECOR™) in the form of:
 - (i) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR) Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
 - (ii) a copy of their valid Manitoba SECOR™ certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Small Employer Certificate of Recognition Program (SECOR™) administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
 - (b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>).
- B13.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.
- B13.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B14. BID SECURITY

- B14.1 The Bidder shall include in its Bid Submission bid security in the form of a digital bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in Form G1: Bid Bond and Agreement to Bond, available on The City of Winnipeg, Corporate Finance, Materials Management Division website at <https://www.winnipeg.ca/MatMgt/templates/files/eBidsecurity.pdf>.
- B14.2 Bid security shall be submitted in a digital format meeting the following criteria:
- (a) The version submitted by the Bidder must have valid digital signatures and seals;
 - (b) The version submitted by the Bidder must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.
 - (c) The version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.
 - (d) The verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.

(e) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B14.2(b).

B14.3 Bonds failing the verification process will not be considered to be valid and the bid shall be determined to be non-responsive in accordance with B18.1(a).

B14.4 Bonds passing the verification process will be treated as original and authentic.

B14.4.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B14.5 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly formed with the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B14.6 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Tender.

B15. OPENING OF BIDS AND RELEASE OF INFORMATION

B15.1 Bids will not be opened publicly.

B15.2 Following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated and pending review and verification of conformance with requirements) will be available on the MERX website at www.merx.com.

B15.3 After award of Contract, the name(s) of the successful Bidder(s) and their Contract amount(s) will be available on the MERX website at www.merx.com.

B15.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).

B15.4.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Bid Submission identified by the Bidder as such in accordance with and by reference to Part 2, Section 17 or Section 18 or Section 26 of The Freedom of Information and Protection of Privacy Act (Manitoba), as amended.

B16. IRREVOCABLE BID

B16.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B16.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly formed and the contract securities have been furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B17. WITHDRAWAL OF BIDS

B17.1 A Bidder may withdraw his/her Bid without penalty prior to the Submission Deadline.

B18. EVALUATION OF BIDS

B18.1 Award of the Contract shall be based on the following bid evaluation criteria:

- (a) compliance by the Bidder with the requirements of the Tender, or acceptable deviation there from (pass/fail);
- (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B13 (pass/fail);
- (c) Total Bid Price;
- (d) economic analysis of any approved alternative pursuant to B7.

B18.2 Further to B18.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.

B18.3 Further to B18.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is qualified.

B18.4 Further to B18.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

B18.4.1 Further to B18.1(a), in the event that a unit price is not provided on Form B: Prices, the City may determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B18.4.2 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B19. AWARD OF CONTRACT

B19.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B19.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be qualified, and the Bids are determined to be responsive.

B19.2.1 Without limiting the generality of B19.2, the City will have no obligation to award a Contract where:

- (a) the prices exceed the available City funds for the Work;
- (b) the prices are materially in excess of the prices received for similar work in the past;
- (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
- (d) only one Bid is received; or
- (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

B19.3 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D35 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

B19.4 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B18.

B19.4.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 2020-01-31) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Tender to a section, clause or subclause with the prefix “C” designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

D1.1 In addition to the *General Conditions for Construction*, these Supplemental Conditions are applicable to the Work of the Contract.

D2. FORM OF CONTRACT DOCUMENTS

D2.1 Notwithstanding C4.1(c) and C4.4, the Contract Documents will be provided to the Contractor electronically and there will be no requirement for execution and return to the City by the Contractor. Accordingly, the provisions under C4.4(a) and C4.4(b) are no longer applicable.

D3. SCOPE OF WORK

D3.1 The major components of the Work are as follows:

- (a) Refurbish Primary Clarifier Travelling Bridge Collector Nos. 1 & 2 running rail, cog rail and related drive system components using materials pre-purchased by the City from the original clarifier supplier's representative and using materials that are to be procured by the Contractor.
- (b) Provide minor structural weld and coating repairs to the Primary Clarifier Travelling Bridge Collector Nos. 1 & 2.
- (c) Provide structural remediation to the aluminum structure of Primary Clarifier Travelling Bridge Collector No. 3 to repair cracked truss sections identified.
- (d) Perform minor electrical remediation works.

D4. DEFINITIONS

D4.1 When used in this Tender:

- (a) “**ABB**” means the manufacturer ASEA Brown Boveri;
- (b) “**Baseline Schedule**” means the time-scaled and precedence diagramming network construction schedule prepared by the Contractor. The Baseline Schedule is produced using the critical path method;
- (c) “**Commissioning**” means the process of verifying that new equipment, and systems are installed, tested and capable of being operated and maintained to perform in conformance with the Drawings and Specifications. Commissioning includes, but is not limited to, satisfactory delivery, installation, training, testing, demonstration, performance verification, and document delivery for all equipment;
- (d) “**Commissioning Team**” means a team led by the Contract Administrator, which is made up of members from the Contractor, Standardization Vendor, Systems Integrator, City, and Contract Administrator. The Commissioning Team will coordinate Commissioning activities through the Contract Administrator.
- (e) “**CSA**” means the Canadian Standards Association international, formerly the Canadian standards association;
- (f) “**Current Schedule**” means the Baseline Schedule that the Contractor has updated to reflect the actual progress of the Work;
- (g) “**DCS**” means distributed control system, an existing ASEA Brown Boveri (ABB) INFI90 control system;
- (h) “**Demonstration Test**” means a test performed by the Commissioning Team, after any required Performance Tests, to demonstrate and confirm that the work meets the specified requirements. The Demonstration Test shall comprise of running the identified Work

continuously for a minimum of 3-days at the specified operating conditions without interruption, or as otherwise specified. Upon successful completion of the Demonstration Test, Form 104 – Certificate of Process Satisfactory Demonstration shall be signed, and the City will take over operation of the identified Unit Process;

- (i) “**EGM**” means Engineers Geoscientists Manitoba;
- (j) “**Facility**” means the SEWPCC;
- (k) “**Facility Area**” means parts of the Facility, including all of its Unit Processes;
- (l) “**FAT**” means factory acceptance testing;
- (m) “**Functional Test**” means a test or tests performed by the Contractor or Manufacturer’s Representative in the presence of the Contract Administrator and the City to demonstrate that installed equipment meets the Manufacturer’s installation, calibration, and adjustment requirements and other requirements as specified. Upon successful completion of the Functional Test, Form 102 – Certificate of Satisfactory Installation shall be signed;
- (n) “**furnish or provide**” means supply and install;
- (o) “**Local HMI**” means a local human machine interface, a subsystem of the PCS that provides the operator user interface;
- (p) “**Intelligent**” means an automation component or system that communicates with the site control system and operates via instructions given and received over a communication medium of a protocol such as Ethernet, PROFIBUS, MODBUS or HART;
- (q) “**I/O**” means input/output;
- (r) “**ITP**” means Inspection and Test Plan;
- (s) “**Manufacturer**” means the person, partnership or corporation responsible for the manufacture and fabrication of Standardized Goods or the equipment supplied by the Contractor for the Work;
- (t) “**Manufacturer’s Representative**” means a trained serviceman empowered by the Manufacturer to provide installation, testing, training and commissioning assistance to the Contractor in his performance of those functions;
- (u) “**PCS**” means process control system. The control system of the sewage treatment plant that provides monitoring and control of the sewage treatment process and ancillary systems, including HVAC and building services;
- (v) “**PCTB**” means Primary Clarifier Travelling Bridge,
- (w) “**Performance Test**” means a test performed by the Contractor or Manufacturer’s Representative in the presence of the Contract Administrator and the City, after any required Functional Test, to demonstrate and confirm that equipment meets the performance requirements specified in individual Specification sections. Performance Tests shall be a minimum of 1-hour in duration, unless otherwise specified. Upon successful completion of the Performance Test, Form 103 – Certificate of Equipment Satisfactory Performance shall be signed;
- (x) “**Performance Verification**” means a test performed by the Commissioning Team, after any required Demonstration Tests, to demonstrate and confirm that the identified Area and/or Unit Processes meet the specified performance requirements of the Work. The Performance Verification shall comprise of running the identified Unit Process between their specified minimum and maximum operating conditions over a 1-day period, or as otherwise specified, when flows and conditions allow. The Performance Verification may take place in conjunction with the Demonstration Test, if conditions and flows allow. Upon successful completion of the Performance Verification, Form 105 – Certificate of Process Satisfactory Performance shall be signed;
- (y) “**PLC**” means programmable logic controller, a component of the PCS that performs monitoring and control of processes within the sewage treatment plant;
- (z) “**Professional Engineer**” means an engineer registered in the Province of Manitoba;

- (aa) **“Project Commissioning Plan”** means a plan created by the Contract Administrator in collaboration with the Contractor detailing the commissioning processes, roles and responsibilities, commissioning specifications and objectives, procedures, verification and certification requirements and documentation and acceptance criteria relative to the Work;
- (bb) **“SAT”** means site acceptance testing;
- (cc) **“SIFT”** means Systems Integration Functional Test;

D5. CONTRACT ADMINISTRATOR

D5.1 The Contract Administrator is KGS Group, represented by:
Lunide Milius-Alphonse, P. Eng.
Telephone No. 204-896-1209 ext. 354
Email Address lmilius-alphonse@kgsgroup.com

D5.2 At the pre-construction meeting, the Contract Administrator will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D6. CONTRACTOR'S SUPERVISOR

D6.1 At the pre-construction meeting, the Contractor shall identify his/her designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D7. NOTICES

D7.1 Except as provided for in C22.4, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid/Proposal.

D7.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D7.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D5.

D7.3 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services
Facsimile No.: 204 947-9155

D8. FURNISHING OF DOCUMENTS

D8.1 Upon award of the Contract, the Contractor will be provided with 'issued for construction' Contract Documents electronically, including Drawings in PDF format only.

D9. COOPERATION WITH OTHERS

D9.1 The Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities, and the staff of the City may be working within the Site. The activities of these agencies may coincide with the Contractor's execution of the Work, and it will be the Contractor's responsibility to schedule activities in advance and cooperate to the fullest extent with other personnel working in the area, and such scheduling and cooperation is an obligation of the Contractor under the terms of this Contract.

- D9.2 The Contractor is advised that the following work is occurring at or in the vicinity of the project Site:
- (a) South End Sewage Treatment Plant (SEWPCC) Upgrading / Expansion Project – Contract 4 – Site wide Mechanical, Electrical, Concrete, and Site Works (reference City of Winnipeg Bid Opportunity No. 976-2016).

SUBMISSIONS

D10. AUTHORITY TO CARRY ON BUSINESS

- D10.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D11. SAFE WORK PLAN

- D11.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Document, if applicable.
- D11.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/Safety/default.stm>
- D11.3 Notwithstanding B13.4 at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D12. INSURANCE

- D12.1 The Contractor shall provide and maintain the following insurance coverage:
- (a) Wrap Up liability insurance, in the amount of at least five million dollars (\$5,000,000.00) inclusive per occurrence and \$5,000,000 general aggregate covering bodily injury, personal injury, damage to the existing structure, products and completed operations, contractual liability and cross liability. Such policy to be written in the name of the Contractor, The City, all consultants, subconsultants and subcontractors and include 24 months completed operations endorsement.
 - (b) If applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence.
 - (c) All risks course of construction insurance in the amount of one hundred percent (100%) of the total Contract Price, including testing and commissioning, written in the name of the Contractor and The City of Winnipeg, Policy is to remain in place until the date of substantial performance for the complete tender, and if all testing and commissioning is not completed at that time, then policy must be extended until such time as all testing and commissioning has been completed.
- D12.2 Deductibles shall be borne by the Contractor.

D12.3 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D12.4 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D13. CONTRACT SECURITY

D13.1 The Contractor shall provide and maintain the performance bond and the labour and material payment bond until the expiration of the warranty period in the form of:

- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; and
- (b) a labour and material payment bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H2: Labour and Material Payment Bond), in an amount equal to fifty percent (50%) of the Contract Price.

D13.1.1 Where the contract security is a performance bond, it may be submitted in hard copy or digital format. If submitted in digital format the contract security must meet the following criteria:

- (a) the version submitted by the Contractor must have valid digital signatures and seals;
- (b) the version submitted by the Contractor must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.
- (c) the version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.
- (d) the verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.
- (e) the results of the verification must provide a clear, immediate and printable indication of pass or fail regarding D13.1(b).

D13.1.2 Digital bonds failing the verification process will not be considered to be valid and may be determined to be an event of default in accordance with C18.1. If a digital bond fails the verification process, the Contractor may provide a replacement bond (in hard copy or digital format) within seven (7) Calendar Days of the City's request or within such greater period of time as the City in its discretion, exercised reasonably, allows.

D13.1.3 Digital bonds passing the verification process will be treated as original and authentic.

D13.2 The Contractor shall provide the City Solicitor with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D13.3 The Contractor shall, as soon as practicable after entering into a contract with a Subcontractor:

- (a) give the Subcontractor written notice of the existence of the labour and material payment bond in D13.1(b); and
- (b) post a notice of the bond and/or a copy of that bond in a conspicuous location at the Site of the Work.

D14. SUBCONTRACTOR LIST

- D14.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D15. DETAILED WORK SCHEDULE

- D15.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract. Only one tank can be removed from service at a time with the City's preference to start draining the tank on a Friday, to have that tank empty, washed down and ready for the following Monday.

- D15.2 The detailed work schedule shall consist of the following:

- (a) a critical path method (C.P.M.) schedule for the Work; and
 - (b) a Gantt chart for the Work based on the C.P.M. schedule;
- all acceptable to the Contract Administrator.

- D15.3 Further to D15.2(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path:

- (a) Mobilization
- (b) Certificate of Equipment Delivery (Form 100)
- (c) Certificate of Readiness to Install (Form 101)
- (d) Shop Drawing and Submittal Reviews
- (e) Primary Clarifier 2
 - (i) Date when clarifier is shutdown and turned over to the Contractor to complete the Primary Clarifier No. 2 refurbishment work. The City estimates to have Primary Clarifier No. 2 isolated, dewatered, and cleaned by November 28, 2021.
 - (ii) Start and finish dates for electrical work.
 - (iii) Start and finish dates for mechanical work.
 - (iv) Start and finish dates for structural work.
 - (v) Start and finish Commissioning.
 - (vi) Start and Finish Training.
 - (vii) Supply of Operations and Maintenance Manuals.
 - (viii) Start and Finish of Performance Verification.
 - (ix) Date clarifier is returned back to City for use.
- (f) Primary Clarifier 1
 - (i) Date when clarifier is shutdown and turned over to the Contractor to complete The Primary Clarifier No. 1 refurbishment work.
 - (ii) Start and finish dates for electrical work.
 - (iii) Start and finish dates for mechanical work.
 - (iv) Start and finish dates for structural work.
 - (v) Start and finish Commissioning.
 - (vi) Start and Finish Training.
 - (vii) Supply of Operations and Maintenance Manuals.
 - (viii) Start and Finish of Performance Verification.
 - (ix) Date clarifier is returned back to City for use.

- (g) Primary Clarifier 3
 - (i) Date when clarifier is shutdown and turned over to the Contractor to complete the Primary Clarifier 3 structural truss repair work.
 - (ii) Start and finish for structural upgrade work.
 - (iii) Start and finish Commissioning.
 - (iv) Start and Finish of Performance Verification.
 - (v) Date clarifier is returned back to City for use.
 - (h) For each clarifier, include 2-3 Working Days for the City to drain and wash down the tanks and 2-3 Working Days for the City to perform preventive maintenance tasks before they are returned into service.
 - (i) Certificate of Satisfactory Installation (Form 102)
 - (j) Substantial Performance.
 - (k) Completion of Deficiencies.
 - (l) Certificate of Equipment Satisfactory Performance (Form 103)
 - (m) Certificate of Satisfactory Process Performance (Form 104)
 - (n) Total Performance.
- D15.4 Further to D15.2(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the trade, task or milestone shall be on the vertical axis.
- D15.5 The schedule shall indicate any planned non-Working Days such as a holiday shutdown between Christmas and New Year's Eve.
- (a) The Contractor should be aware that City Operations staff will not be working at the SEWPCC on December 27, 2021, December 28, 2021 and January 3, 2022 inclusive. City staff is minimal between December 24, 2021 and January 3, 2022.
- D15.6 Update the Detailed Work Schedule to reflect actual progress on a regular basis. Update the schedule at least once every two (2) weeks and as requested by the Contract Administrator.
- D15.7 The Contractor shall keep a copy of the Gantt chart schedule on-Site for tracking progress and updating on a daily basis.
- D15.8 Following submission of the Detailed Work Schedule, but prior to the commencement of any Works, the Contractor shall attend a scheduling meeting with the Contract Administrator and the City. The Contract Administrator will advise the Contractor of the meeting time and location. The purpose of this meeting will be to review the Contractor's schedule and to address any scheduling concerns that may arise during review of the schedule. The Contractor shall not be permitted to commence any Works unless the Contract Administrator is satisfied with the Contractor's understanding of the scheduling requirements and is satisfied that the proposed schedule can reasonably be followed to complete the Works within the Project time constraints.
- D15.9 Only one clarifier tank can be removed from service at any time. For each clarifier, include 2-3 Working Days for the City to drain and wash down the tanks and 2-3 Working Days for the City to perform preventive maintenance tasks before they are returned into service.
- D15.10 The City will not remove a clarifier tank from service until the Contractor has procured and received all parts required for the refurbishment works related to that clarifier.

D16. QUALITY MANAGEMENT PLAN

- D16.1 The Contractor shall provide the Contract Administrator with a Quality Management Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Document, if applicable.

SCHEDULE OF WORK

D17. COMMENCEMENT

- D17.1 The Contractor shall not commence any Work until he/she is in receipt of an award letter from the Award Authority authorizing the commencement of the Work.
- D17.2 The Contractor shall not commence any Work on the Site until:
- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D10;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the Safe Work Plan specified in D11;
 - (iv) evidence of the insurance specified in D12;
 - (v) the contract security specified in D13;
 - (vi) the Subcontractor list specified in D14; and
 - (vii) the detailed work schedule specified in D15.
 - (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.
- D17.3 The Contractor shall not commence the Work on the Site before November 29, 2021.
- D17.4 The City intends to award this Contract by August 3rd, 2021.
- D17.4.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D18. RESTRICTED WORK HOURS

- D18.1 Work hours are restricted to 0730 hours and 1530 hours, five (5) days a week, Monday to Friday inclusive, excluding Statutory Holidays and/or Civic Holidays, unless otherwise authorized by the City by written approval

D19. DAMAGE TO EXISTING STRUCTURES AND PROPERTY

- D19.1 The Contractor shall take special care to avoid damage to the existing SEWPCC structures and property during the course of Work.
- D19.2 The Contractor is advised that, the Contract Administrator will, in the presence of the Contractor, develop a Pre-Construction Site Record. The Pre-Construction Site Record will be a record of the project Site conditions by means of photographs or other documentation or media. This record will be shared with the Contractor and the City, and will require signatures from the Contract Administrator, the City and the Contractor indicating acceptance of the preconstruction site conditions prior to commencing the Works.
- D19.3 Any damage caused by the Contractor or his Subcontractors to any part of the SEWPCC, or to the adjacent structures or properties shall be promptly repaired by the Contractor at his own expense to the satisfaction of the Contract Administrator. Prior to Total Performance of the Project, the Contractor, the City and the Contract Administrator will review the Pre-Construction Site Record and ensure that the Site has been restored to its preconstruction state. Any remaining damage shall be repaired by the Contractor at his own expense to the satisfaction of the Contract Administrator.

D20. WORK BY OTHERS

- D20.1 The Contractor is advised that while the laydown area for this Contract (as shown in Appendix C) is on the SEWPCC property, the at grade pathway between the laydown area and the

loading door located at the southwest corner of the Primary Clarifier No. 3 building is currently in the care and control of NAC Constructors Ltd. under City of Winnipeg Bid Opportunity 976-2016.

- D20.1.1 Access to this pathway by the Contractor shall require written approval by the Contract Administrator at least forty-eight (48) hours in advance of any work to be performed in this area.
- D20.1.2 The Contractor and any Subcontractors shall attend a NAC Constructors Ltd. site safety orientation prior to undertaking any work in the area under Bid Opportunity 976-2016 control.
- D20.2 For each clarifier, provide 2 to 3 days for the City to drain and wash down the tanks and provide 2 to 3 days for the City to perform preventive maintenance tasks before they are returned to service.

D21. CRITICAL STAGES

- D21.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:
- (a) Completion of all Refurbishment Work for Primary Clarifier No. 2 and Completion of all Commissioning tasks for Primary Clarifier No. 2 by January 11, 2022.
 - (b) Completion of all Refurbishment Work for Primary Clarifier No. 1 and Completion of all Commissioning tasks for Primary Clarifier No. 1 by February 15, 2022.
 - (c) Completion of all Work for Primary Clarifier No. 3 and Completion of all Commissioning tasks for Primary Clarifier No. 3 by March 1, 2022.
- D21.2 The Critical Stages identified in D21.1 (b), (d), and (e) are the dates by which each respective primary clarifier has been fully Commissioned, accepted by and turned over to the City of Winnipeg.
- D21.3 The above dates may be subject to change at the discretion of the Contract Administration if a portion(s) of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the City (e.g. an early Spring snow melt and the associated high wastewater levels and flows entering the SEWPCC for processing).

D22. SUBSTANTIAL PERFORMANCE

- D22.1 The Contractor shall achieve Substantial Performance by March 1, 2022
- D22.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.
- D22.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D23. TOTAL PERFORMANCE

- D23.1 The Contractor shall achieve Total Performance by April 15, 2022.
- D23.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D23.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D24. LIQUIDATED DAMAGES

D24.1 If the Contractor fails to achieve Critical Stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:

- (a) Completion of all Refurbishment Work for Primary Clarifier No. 2 and Completion of all Commissioning tasks for Primary Clarifier No. 2 as specified in D21.1(a) – five (5) thousand dollars (\$5,000);
- (b) Completion of all Refurbishment Work for Primary Clarifier No. 1 and ready to begin all Commissioning tasks for Primary Clarifier No. 3 as specified in D21.1(b) – five (5) thousand dollars (\$5,000);
- (c) Completion of all Work for Primary Clarifier No. 3 and Completion of all Commissioning tasks for Primary Clarifier No. 3 as specified in D21.1(c) – five (5) thousand dollars (\$5,000);
- (d) Substantial Performance – as specified in D22.1 – one (1) thousand dollars (\$1,000);
- (e) Total Performance – as specified in D23.1 – five (5) hundred dollars (\$500) per Working Day.

D24.2 The amounts specified for liquidated damages in D24.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

D24.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D25. COVID-19 SCHEDULE DELAYS

D25.1 The City acknowledges that the schedule for this Contract may be impacted by the COVID-19 pandemic. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the health and safety of workers and the public, directives from health authorities and various levels of government and in close consultation with the Contract Administrator.

D25.2 If the Contractor is delayed in the performance of the Work by reason of the COVID-19 pandemic, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.

D25.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether COVID-19 will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to COVID-19, including but not limited to evidence related to availability of staff, availability of Material or work by others.

D25.4 For any delay related to COVID-19 and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D25.3. Failure to provide this notice will result in no additional time delays being considered by the City.

D25.5 The Work schedule, including the durations identified in D21 to D23 where applicable, will be adjusted to reflect delays accepted by the Contract Administrator. No additional payment will be made for adjustment of schedules except where seasonal work, not previously identified in the Contract, is carried over to the following construction season.

- D25.6 Where Work not previously identified is being carried over solely as a result of delays related to COVID-19, as confirmed by the Contract Administrator, the cost of temporary works to maintain the Work in a safe manner until Work recommences, will be considered by the Contract Administrator. Where the Work is carried over only partially due to COVID-19, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.
- D25.7 Any time or cost implications as a result of COVID-19 and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

CONTROL OF WORK

D26. JOB MEETINGS

- D26.1 Regular weekly job meetings will be held via MS Teams. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.
- D26.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D27. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

- D27.1 Further to C6.26, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

D28. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

- D28.1 Further to B13.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B13.4.

D29. LAYOUT OF WORK

- D29.1 The Contractor shall be responsible for the true and proper laying out of the Work and for the correctness of the location, levels, dimensions, and alignment of all aspects of the Work. He shall provide all required instruments and competent personnel for performing all layouts.
- D29.2 The Contract Administrator shall be notified at least one (1) Working Day prior to any Work being commenced in order to have the option to check and review all elevations and layouts at his discretion.
- D29.3 The Contractor shall carefully protect and preserve all benchmarks, pins, stakes, and other items of the basic data supplied by the Contract Administrator. Any such benchmarks, pins, or stakes removed or destroyed by the Contractor, without the consent of the Contract Administrator, shall be replaced by the Contract Administrator at the expense of the Contractor.
- D29.4 The Contractor shall arrange and carry on his Work so as not to conflict with the collection of any data in anyway by the Contract Administrator. The Contractor shall adjust Work and/or remove any interference as directed by the Contract Administrator at the expense of the Contractor.

D30. REQUEST FOR INFORMATION AND NON-CONFORMANCE REPORTS

- D30.1 For all Request for Information (RFI"s) and Non-Conformance Report (NCR"s) submissions, the Contractor shall assume a minimum of forty-eight (48)-hour response time will be required per submission.
- D30.2 The Contractor shall not undertake work associated with these submissions until the Contract Administrator review is completed and responded to in writing.

MEASUREMENT AND PAYMENT

D31. INVOICES

- D31.1 Further to C12, the Contractor shall submit an invoice for each portion of Work performed to the Contract Administrator identified in D4.

The City of Winnipeg
Corporate Finance - Accounts Payable
4th Floor, Administration Building, 510 Main Street
Winnipeg, MB R3B 1B9

Facsimile No.: 204 949-0864

Send Invoices to CityWpgAP-INVOICES@winnipeg.ca

Send Invoice Inquiries to CityWpgAP-INQUIRIES@winnipeg.ca

- D31.2 Invoices must clearly indicate, as a minimum:
- (a) the City's purchase order number;
 - (b) date of delivery;
 - (c) delivery address;
 - (d) type and quantity of work performed;
 - (e) the amount payable with GST and MRST shown as separate amounts; and
 - (f) the Contractor's GST registration number.
- D31.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.

D32. PAYMENT

- D32.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

D33. PAYMENT SCHEDULE

- D33.1 The City's payment to the Contractor, associated with Standardized Goods, will be in accordance with C12.

WARRANTY

D34. WARRANTY

- D34.1 Warranty is as stated in C13.

THIRD PARTY AGREEMENTS

D35. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

- D35.1 In the event that funding for the Work of the Contract is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, the following terms and conditions shall apply, as required by the applicable funding agreements.
- D35.2 Further to D35.1, in the event that the obligations in D35 apply, actual costs legitimately incurred by the Contractor as a direct result of these obligations ("Funding Costs") shall be determined by the actual cost to the Contractor and not by the valuation method(s) outlined in C7.4. In all other respects Funding Costs will be processed in accordance with Changes in Work under C7.
- D35.3 For the purposes of D35:
- (a) "**Government of Canada**" includes the authorized officials, auditors, and representatives of the Government of Canada; and
 - (b) "**Government of Manitoba**" includes the authorized officials, auditors, and representatives of the Government of Manitoba.
- D35.4 Modified Insurance Requirements
- D35.4.1 If not already required under the insurance requirements identified in D12, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars (\$2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and its Ministers, officers, employees, and agents shall be added as additional insureds.
- D35.4.2 If not already required under the insurance requirements identified in D12, the Contractor will be required to provide builders' risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.
- D35.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars (\$2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.
- D35.4.4 Further to D12.4, insurers shall provide satisfactory Certificates of Insurance to the Government of Manitoba prior to commencement of Work as written evidence of the insurance required. The Certificates of Insurance must provide for a minimum of thirty (30) days' prior written notice to the Government of Manitoba in case of insurance cancellation.
- D35.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.
- D35.5 Indemnification By Contractor
- D35.5.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.

D35.6 Records Retention and Audits

D35.6.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.

D35.6.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D35.6.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.

D35.7 Other Obligations

D35.7.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.

D35.7.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.

D35.7.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.

D35.7.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.

D35.7.5 The Contractor represents and warrants that no current or former public servant or public office holder, to whom the Value and Ethics Code for the Public Sector, the Policy on Conflict of Interest and Post Employment, or the Conflict of Interest Act applies, shall derive direct benefit from this Contract, including any employment, payments, or gifts, unless the provision or receipt of such benefits is in compliance with such codes and the legislation.

D35.7.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

FORM H1: PERFORMANCE BOND
(See D13)

KNOW ALL MEN BY THESE PRESENTS THAT

_____ ,
(hereinafter called the "Principal"), and

_____ ,
(hereinafter called the "Surety"), are held and firmly bound unto **THE CITY OF WINNIPEG** (hereinafter called the "Obligee"), in the sum of

_____ dollars (\$_____)

of lawful money of Canada to be paid to the Obligee, or its successors or assigns, for the payment of which sum the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has entered into a written contract with the Obligee for

TENDER NO. 391-2021

SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER REFURBISHMENT WORKS

which is by reference made part hereof and is hereinafter referred to as the "Contract".

NOW THEREFORE the condition of the above obligation is such that if the Principal shall:

- (a) carry out and perform the Contract and every part thereof in the manner and within the times set forth in the Contract and in accordance with the terms and conditions specified in the Contract;
- (b) perform the Work in a good, proper, workmanlike manner;
- (c) make all the payments whether to the Obligee or to others as therein provided;
- (d) in every other respect comply with the conditions and perform the covenants contained in the Contract; and
- (e) indemnify and save harmless the Obligee against and from all loss, costs, damages, claims, and demands of every description as set forth in the Contract, and from all penalties, assessments, claims, actions for loss, damages or compensation whether arising under "The Workers Compensation Act", or any other Act or otherwise arising out of or in any way connected with the performance or non-performance of the Contract or any part thereof during the term of the Contract and the warranty period provided for therein;

THEN THIS OBLIGATION SHALL BE VOID, but otherwise shall remain in full force and effect. The Surety shall not, however, be liable for a greater sum than the sum specified above.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable as Principal, and that nothing of any kind or matter whatsoever that will not discharge the Principal shall operate as a discharge or release of liability of the Surety, any law or usage relating to the liability of Sureties to the contrary notwithstanding.

IN WITNESS WHEREOF the Principal and Surety have signed and sealed this bond the

_____ day of _____, 20____ .

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

By: _____ (Seal)
(Attorney-in-Fact)

FORM H2: LABOUR AND MATERIAL PAYMENT BOND
(See D13)

KNOW ALL MEN BY THESE PRESENTS THAT

his/its heirs, executors, administrators, successors or assigns (hereinafter called the "Principal"), and

his/its heirs, executors, administrators, successors or assigns (hereinafter called the "Surety"), are held and firmly bound unto **THE CITY OF WINNIPEG** (hereinafter called the "Obligee"), for the use and benefit of claimants as herein below defined, in the amount of

_____ dollars (\$_____)

of lawful money of Canada, for the payment whereof we, the Principal and the Surety jointly and severally bind ourselves firmly by these presents.

WHEREAS the Principal has entered into a written contract with the Obligee for

TENDER NO. 391-2021

SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIERS REFURBISHMENT WORK

which is by reference made part hereof and is hereinafter referred to as the "Contract".

NOW THEREFORE the condition of the above obligation is such that if the Principal shall promptly make payment to all claimants as hereinafter defined, for all labour, service and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void, otherwise it shall remain in full force and effect subject, however, to the following conditions:

- (a) A claimant is defined as one having a direct contract with the Principal for labour, service and material, or any of them, used or reasonably required for use in the performance of the contract, labour, service and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment (but excluding rent of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract;
- (b) The above-named Principal and Surety hereby jointly and severally agree with the Obligee that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work, labour or service was done or performed, or materials were furnished by such claimant, may sue on this bond, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon;
- (c) No suit or action shall be commenced hereunder by any claimant
 - (ii) unless claimant shall have given written notice to the Principal and the Surety above-named, within one hundred and twenty (120) days after such claimant did or performed the last of the work, labour or service, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work, labour or service was done or performed. Such notice shall be served by mailing the same by registered mail to the Principal, and Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the Province of Manitoba;

- (iii) after the expiration of one (1) year following the date on which Principal ceased work on said Contract; including work performed under the guarantees provided in the Contract;
 - (iv) other than in a court of competent jurisdiction in the Province of Manitoba.
- (d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.
- (e) The Surety shall not be liable for a greater sum than the specified penalty of this bond.

The Principal and Surety hereby agree that The Guarantors' Liability Act (Manitoba) shall apply to this Bond.

IN TESTIMONY WHEREOF, the Principal has hereunto set its hand affixed its seal, and the Surety has caused these presents to be sealed and with its corporate seal duly attested by the authorized signature of its signing authority this

_____ day of _____, 20____.

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

By: _____ (Seal)
(Attorney-in-Fact)

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/Spec/Default.stm>
- E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.2.3 Further to C2.4(d), Specifications included in the Tender shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.3 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B7. In every instance where a brand name or design specification is used, the City will also consider approved equals and/or approved alternatives in accordance with B7.
- E1.4 The following are applicable to the Work:

<u>Specification No.</u>	<u>Specification Title</u>
	Table of Contents
NMS SPECIFICATIONS	
DIVISION 01 –	GENERAL REQUIREMENTS
013300	Submittal Procedures
013529.06	Health and Safety Requirements
014500	Quality Control
017411	Cleaning
017800	Closeout Submittals
DIVISION 05	METALS
051223	Structural Steel
051224	Paint Touch-ups
055001	Primary Clarifier #3 Aluminium Bridge Repairs
DIVISION 14	MECHANICAL
140001	General - Mechanical
149999A	PCTB Drive Refurbishment
149999B	PCTB Rail, Track, and Anchor Bolt Refurbishment
DIVISION 26	ELECTRICAL
260501	Common Work Result – For Electrical
260520	Wire and Box Connectors 0-1000 V
260521	Wires and Cables
260529	Hangers and Supports for Electrical Systems
260531	Splitters, Junction, Pull Boxes and Cabinets
260532	Outlet Boxes, Conduit Boxes and Fittings
260534	Conduits, Conduit Fastenings and Conduit Fittings
262823	Disconnect Switches – Fused and Non-Fused
Appendix A	Walker Process Documentation
Appendix B	Inspection and Test Plan
Appendix C	Site Plan for Laydown Area

Appendix D	Construction Plan
Appendix E	Commissioning Plan
Appendix F	City Forms
Appendix G	Project Materials List
Appendix H	Environmental Management Policy
Appendix I	Testlabs Inspection Reports
Appendix J	Quality Control Checklists
Appendix K	Sample Documents

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
1-0102-ESLD-P003	Cover Sheet
1-0102-ESLD- P004	Electrical- Single Line Diagram – Primary Clarifier – MCC-P710
	Electrical- Single Line Diagram – Primary Clarifier – MCC-P720 and Miscellaneous
1-0102-EGAD-P003	Electrical- Power and Instrumentation – Main Floor Plan – Primary Clarifier 1 & 2 Elev. 234.29M
1-0102-EGAD-P004	Electrical- Power and Instrumentation – Main Floor Plan – Primary Clarifier 3 Elev. 234M
1-0102-SGAD-P002	Primary Clarifiers # 1 & 2 Guardrail Repair Details
1-0102-SGAD-P003 001	Primary Clarifier 3 Bridge Structural Plan, Sections & Details – Sheet 1
1-0102-SGAD-P003 002	Primary Clarifier 3 Bridge Structural Plan, Sections & Details – Sheet 2

E2. HAZARDOUS MATERIALS

E2.1 If asbestos or other hazardous materials are encountered during the Work of the Contract, the Contractor shall stop all work and notify the Contract Administrator immediately. Removal of hazardous materials shall be dealt with by the City and the Contractor shall await further instruction by the Contract Administrator.

E3. SHOP DRAWINGS

E3.1 Description

E3.1.1 This Specification provides instructions for the preparation and submission of shop drawings

- (a) The term “Shop Drawings” means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, including Site erection drawings which are to be provided by the Contractor to illustrate details of a portion of the Work; and
- (b) Submit specified Shop drawings to the Contract Administrator for review. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be shown on all submissions for Contract Administrator review.

E3.2 Shop Drawings

E3.2.1 Original Drawings shall be prepared by Contractor, Subcontractor, supplier, distributor or manufacturer to illustrate appropriate portion of Work including fabrication, layout, setting or erection details as specified in appropriate sections.

E3.2.2 Shop Drawings for the following components shall bear the seal of a Professional Engineer registered in the Province of Manitoba and shall be signed and dated by the Engineer:

- (a) Using a precision laser tracking service to measure the bridge and all rail components before and after installation, provide shop drawings in accordance with Mechanical Specifications Section 14 99 99B, 1.4.2.1 and 1.4.2.2.

- E3.2.3 Shop Drawings shall also be submitted for the following components:
- (a) Position and tolerance of all new anchor bolts and grout pads overlaid on the existing anchor bolt pattern in accordance with Section 14 99 99B 1.4.3.
 - (b) Shaft section showing misalignment or runout of the machined surfaces relative to the shaft centreline in accordance with Section 14 99 99A 3.2.3.
 - (c) If applicable, modifications to permanent hand railing removed.
 - (d) Supply of electrical materials in accordance with the following specification sections:
 - (i) 26 05 01
 - (ii) 26 05 01
 - (iii) 26 05 20
 - (iv) 26 05 21
 - (v) 26 05 29
 - (vi) 26 05 31
 - (vii) 26 05 32
 - (viii) 26 05 34
 - (ix) 26 28 23
 - (e) Supply of all electrical equipment as outlined in Supplemental Electrical Specifications Division 26.
- E3.3 Contractor's Responsibilities
- (a) Review Shop Drawings, product data and samples prior to submission and stamp and sign drawings indicating conformance to the Contract requirements.
 - (b) Verify:
 - (i) Field Measurements;
 - (ii) Field Construction Criteria; and,
 - (iii) Catalogue numbers and similar data.
 - (c) Coordinate each submission with requirements of Work and Contract Documents.
 - (d) Individual Shop Drawings will not be reviewed until all related drawings are available.
 - (e) Notify Contract Administrator, in writing at time of submission, of deviations from requirements of Contract Documents.
 - (f) Responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator's review of submission, unless Contract Administrator gives written acceptance of specified deviations.
 - (g) Responsibility for errors and omissions in submission is not relieved by Contract
 - (h) Administrator's review of submittals.
 - (i) Make any corrections required by the Contract Administrator and resubmit corrected copies of Shop Drawings. Direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Contract Administrator on previous submission.
 - (j) After Contract Administrator's review and return of copies, distribute copies to
 - (k) Subcontractors and others as appropriate.
 - (l) Maintain one (1) complete printed paper set of reviewed Shop Drawings, filed by Specification Section Number, at the Site of the Work for use and reference of the Contract Administrator and Subcontractors.
- E3.4 Submission Requirements
- (a) Schedule submissions at least fourteen (14) Calendar Days before dates reviewed submissions will be needed, and allow for a seven (7) Calendar Day period for review by the Contract Administrator of each individual submission and re-submission, unless noted otherwise in the Contract Documents.

- (b) Submit PDF copies of Shop Drawings.
- (c) Accompany submissions with transmittal/cover letter containing:
 - (i) Date
 - (ii) Project title and Tender number
 - (iii) Contractor's name and address
 - (iv) Number of each Shop Drawing, product data and sample submitted
 - (v) Specification Section, Title, Number and Clause
 - (vi) Drawing Number and Detail / Section Number
 - (vii) Other pertinent data
- (d) Submissions shall include:
 - (i) Date and revision dates
 - (ii) Project title and Tender number
 - (iii) Name of:
 - (i) Contractor
 - (ii) Subcontractor
 - (iii) Supplier
 - (iv) Manufacturer
 - (v) Detailer (if applicable)
 - (iv) Identification of product or material
 - (v) Relation to adjacent structure or materials
 - (vi) Field dimensions, clearly identified as such
 - (vii) Specification section name, number and clause number or drawing number and detail / section number
 - (viii) Applicable standards, such as CSA or CGSB numbers
 - (ix) Contractor's stamp, initialled or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents

E3.5 Other Considerations

- (a) Fabrication, erection, installation or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent shop drawings and resubmit.
- (b) Material and equipment delivered to the Site of the Works will not be paid for at least until pertinent Shop Drawings have been submitted and reviewed.
- (c) Incomplete Shop Drawing information will be considered as stipulated deductions for the purposes of progress payment certificates.
- (d) No delay or cost claims will be allowed that arise because of delays in submissions, re-submissions and review of Shop Drawings.

E4. ADDITIONAL WORK

- E4.1 Additional Work may be necessitated due to unforeseen circumstances that may arise during the course of the project due to:
 - (a) Additions to the scope of Work by the Contract Administrator, beyond that defined herein.
- E4.2 A cash allowance has been included on Form B: Prices.
- E4.3 The City reserves the right to delete any or all of the Cash Allowance from the Contract if the Work intended to be covered by the Cash Allowance is not required, or if the Works intended are found to be more extensive than the provisional Cash Allowance.
- E4.4 Cost of additional work shall be evaluated by the methods outlined in C7.4, and a Change Order prepared by the Contract Administrator. Cost of the Change Order will be paid on the Progress

Estimate and deducted from the Cash Allowance. If the valuation of the authorized work exceeds the Value of the Cash Allowance, the Contract Value will be adjusted by the shortfall.

E4.5 Additional services and/or Work will not be initiated for:

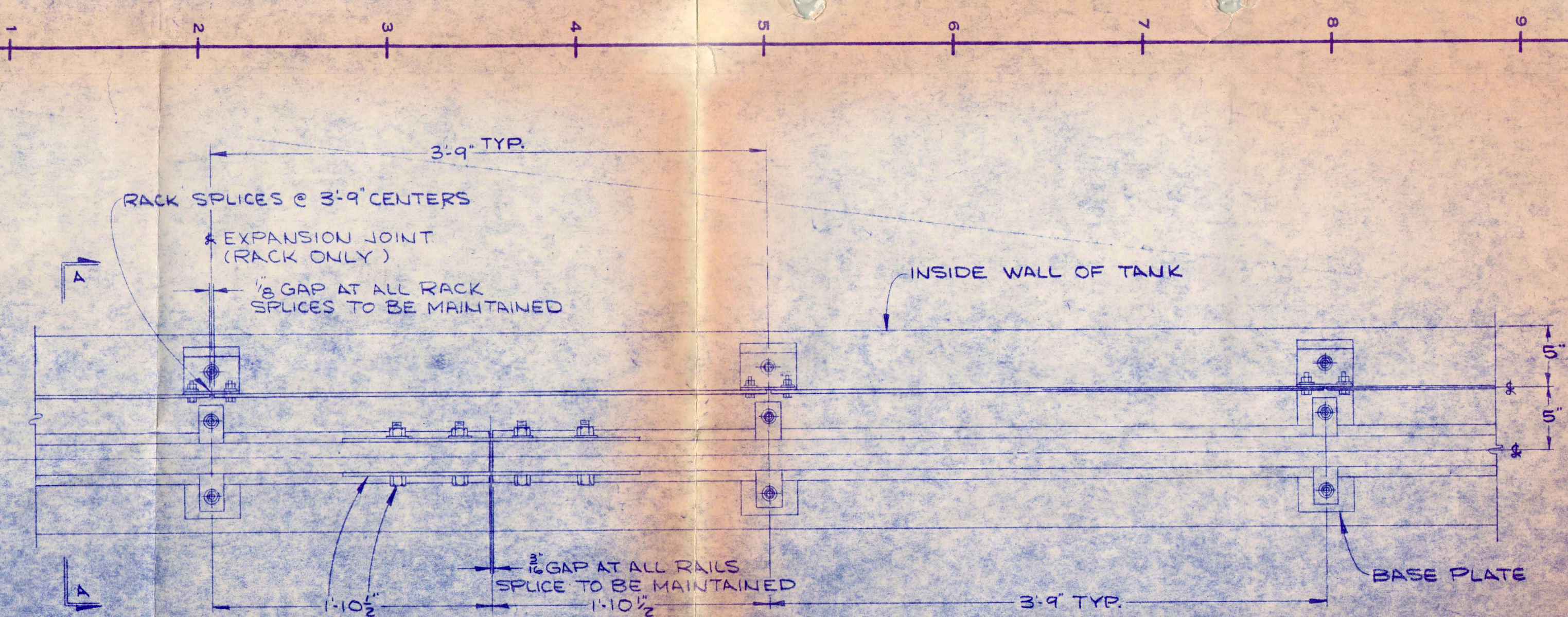
- (a) Reasons of lack of performance or errors in execution.
- (b) Scheduling changes initiated by the City, where at least 24 hours notice is given prior to the Contractors schedule time to be on Site.

E4.6 Should it be determined that additional material or services are required, the Contract Administrator shall approve the Work, prior to commencement of the additional Work.

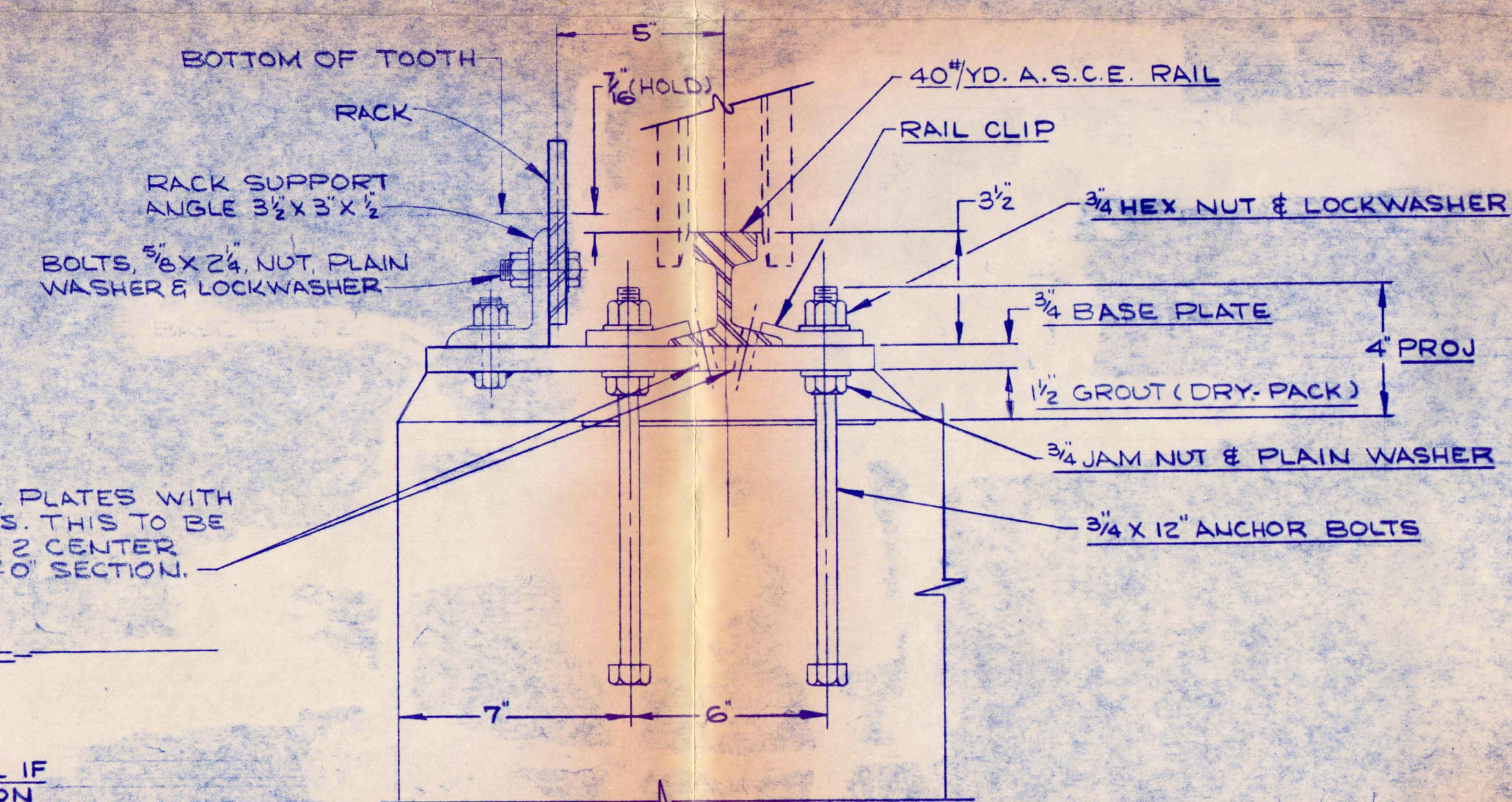
E4.7 Material Mark-Up Factors:

- (a) The base cost is to be the wholesale cost of the material, regardless of the Contractor or Subcontractor supplying the material.
- (b) In general, the party (Contractor or Subcontractor) supplying the material is the party that purchases the material from a supplier who does not perform any work on Site, unless otherwise determined by the Contract Administrator.
- (c) Where the Contractor is supplying the material, the mark-up on the material is limited to fifteen percent (15%).
- (d) Where a Subcontractor is supplying the material, the total mark-up on the material, including all Subcontractors and the Contractor is limited to twenty-five percent (25%), including the Contractor and all Subcontractors' mark-ups.
- (e) Where the Contractor's immediate Subcontractor is supplying the material:
 - (i) The Subcontractor's mark-up on the material is limited to fifteen percent (15%);
 - (ii) The Contractor's mark-up on the material is limited to ten percent (10%).
- (f) A Third-Level Subcontractor is a Subcontractor of a Subcontractor of the Contractor.
 - (i) No Third-Level Subcontractors on this project are approved for additional mark-up.
 - (ii) In the event that a Third-Level Subcontractor is utilized, that is not approved for additional mark-up, the Contractor is responsible for coordinating the split of the maximum approved mark-up between the Contractor and Subcontractors.

APPENDIX A
WALKER PROCESS DOCUMENTATION



TIGHTEN THESE FASTENERS (RAIL SPLICES ONLY) ONLY ENOUGH TO HALFWAY COMPRESS SPRING LOCKWASHER - ALL OTHER FASTENERS TO BE TIGHTENED FULLY



DRILL THRU RAILS & BASE PLATES WITH 1/2" DRILL & INSTALL DOWELS. THIS TO BE DONE (IN FIELD) ONLY AT 2' CENTER BETWEEN PLATES OF EACH 30'-0" SECTION. ONLY

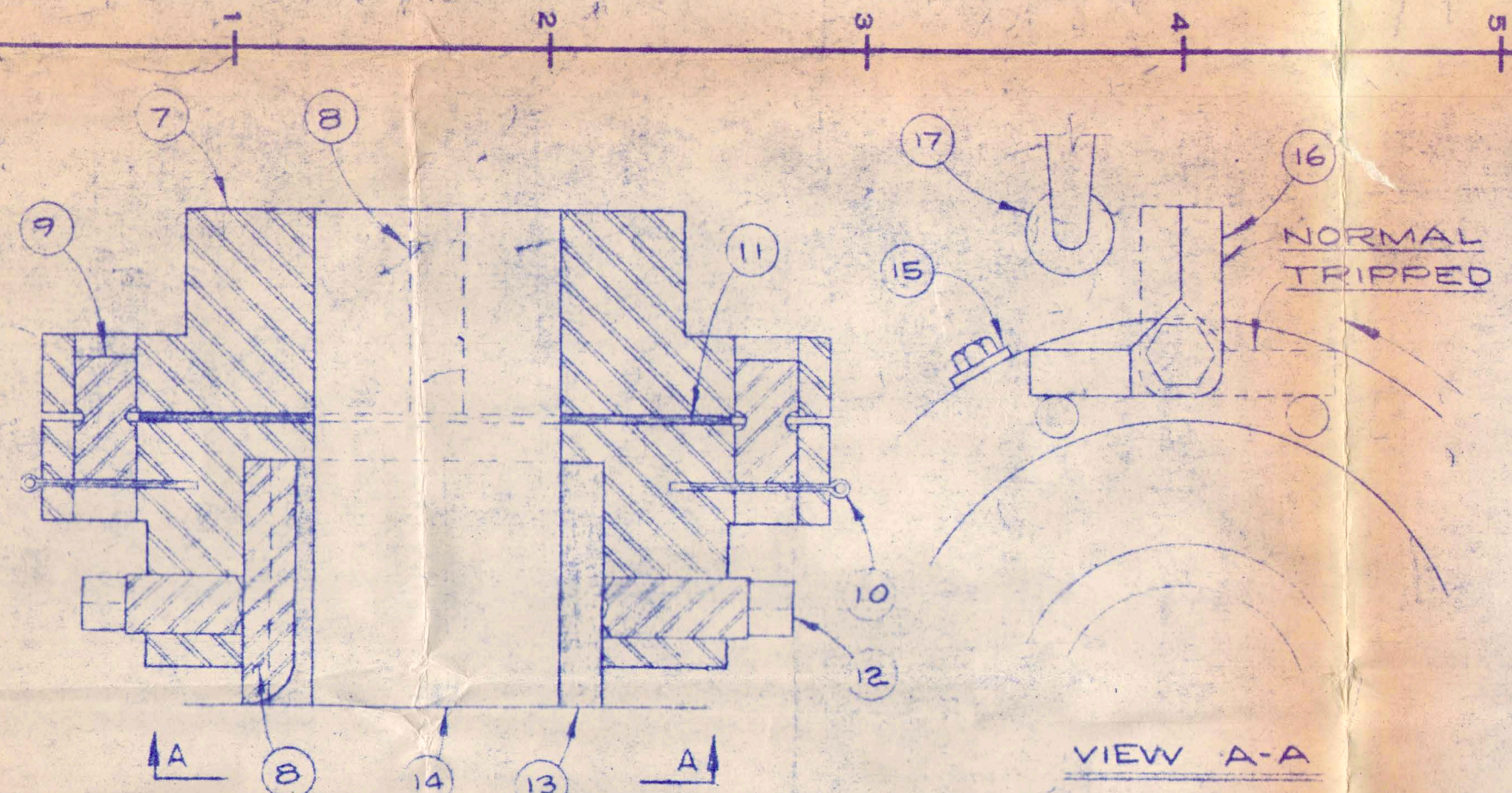
NOTE
 USE ONLY ONE RAIL DOWEL IF CONCRETE WALL EXPANSION JOINT FALLS WITHIN CENTER OF RAIL SECTION

SUBSTITUTION OF CINCH ANCHORS, EXPANSIONS SHIELDS, STUDS, SET WITH A STUD DRIVER OR THE LIKE, IN PLACE OF ANCHOR BOLTS, PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.	
CHANGED 5/16" TO 7/16" ADDED NOTE	CR GR
NO.	10-13-71 1/28-72
REVISIONS	DATE
THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT. REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.	
DRAWN CHECKED APPR.	DATE 8-13-71 9-27-71
BY GR GR	WALKER PROCESS EQUIPMENT DIVISION OF CHICAGO BRIDGE & IRON CO. AURORA, ILL., U.S.A.
SCALE 3" = 1 1/2"	RAIL & RACK SPLICE DETAILS TRAVELING BRIDGE COLLECTOR TYPE 'CB' WINNIPEG, MANITOBA
CONTRACT 71W352W	FILE 3533233-2

FILE 3533233-2

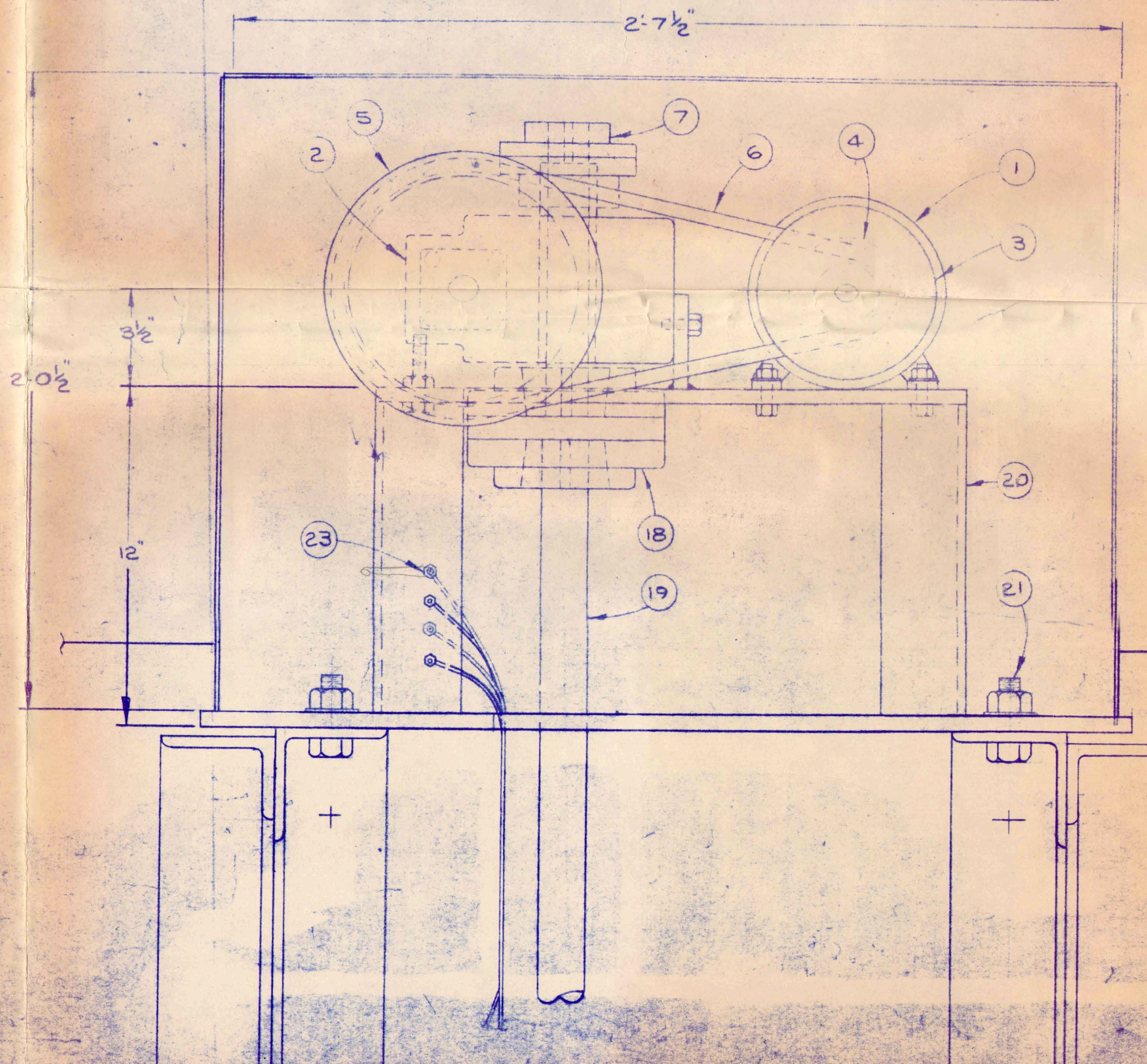
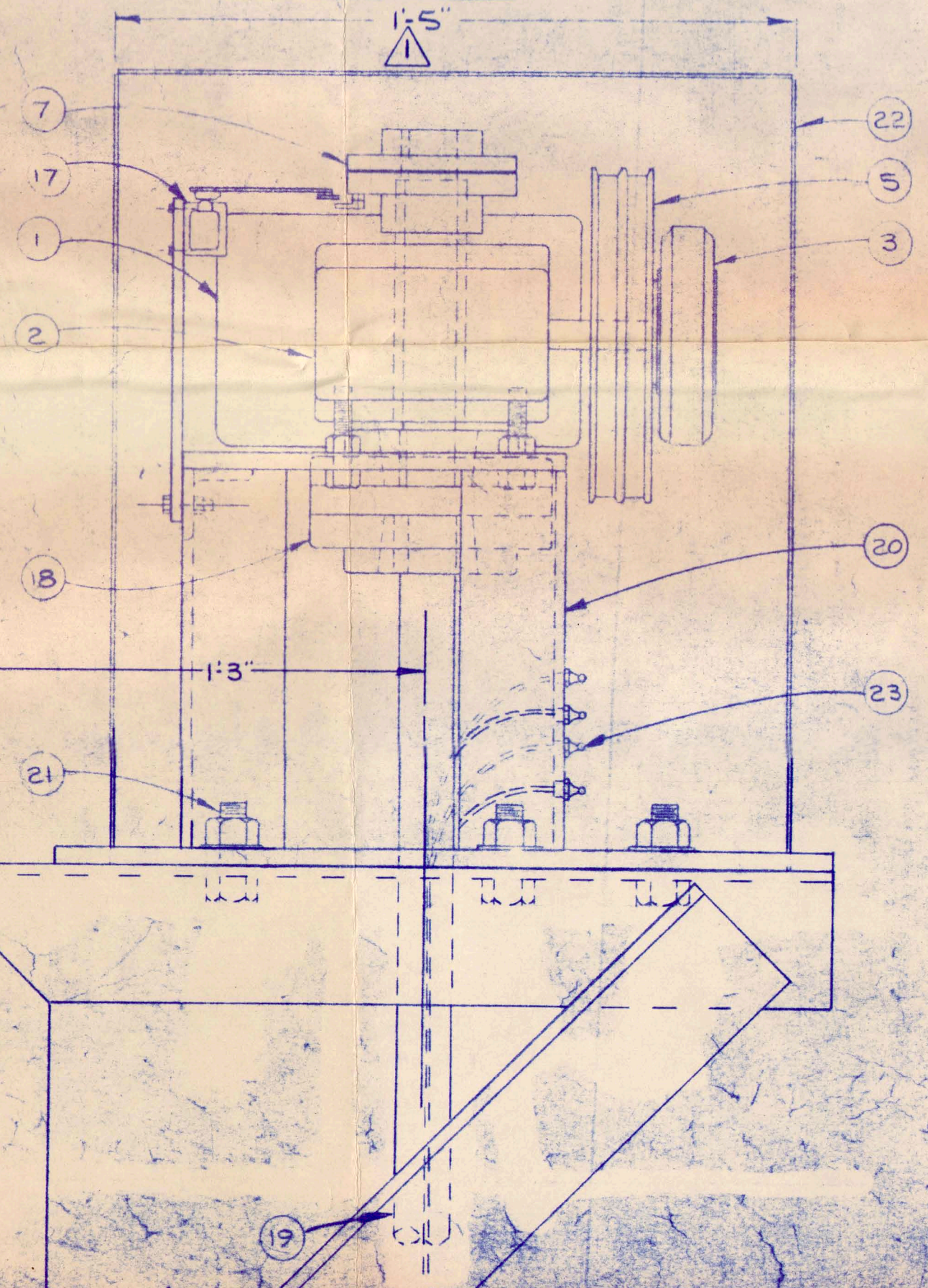
ASSEMBLY LIST

- | | |
|-----------------------------------|-----------------------------|
| 1 - MOTOR - 3/4 H.P. | 13 - REDUCER SHAFT - HOLLOW |
| 2 - REDUCER - VON RUDEN #303 | 14 - DRIVE SHAFT |
| 3 - COUPLING - DODGE FLEXIDYNE | 15 - TRIPPER |
| 4 - SHEAVE - 3.4" P.D. - 2 GROOVE | 16 - TRIP ARM |
| 5 - SHEAVE - 9" P.D. - 2 GROOVE | 17 - LIMIT SWITCH |
| 6 - V-BELT | 18 - FLEX. DISC COUPLING |
| 7 - SHEAR PIN COUPLING | 19 - TORQUE TUBE - 1 5/8" |
| 8 - KEY | 20 - DRIVE BASE |
| 9 - SHEAR PIN | 21 - ANCHOR BOLTS |
| 10 - COTTER KEY | 22 - DRIVE COVER |
| 11 - 1/16 PHENOLIC WASHER | 23 - GREASE FITTINGS |
| 12 - SET SCREWS - 3/8" | |
- (2 ONLY REQ'D. WHEN ALTERNATE GREASE LINES ARE USED)



VIEW A-A

DETAIL OF SHEAR PIN COUPLING



NO.	REVISIONS	DATE

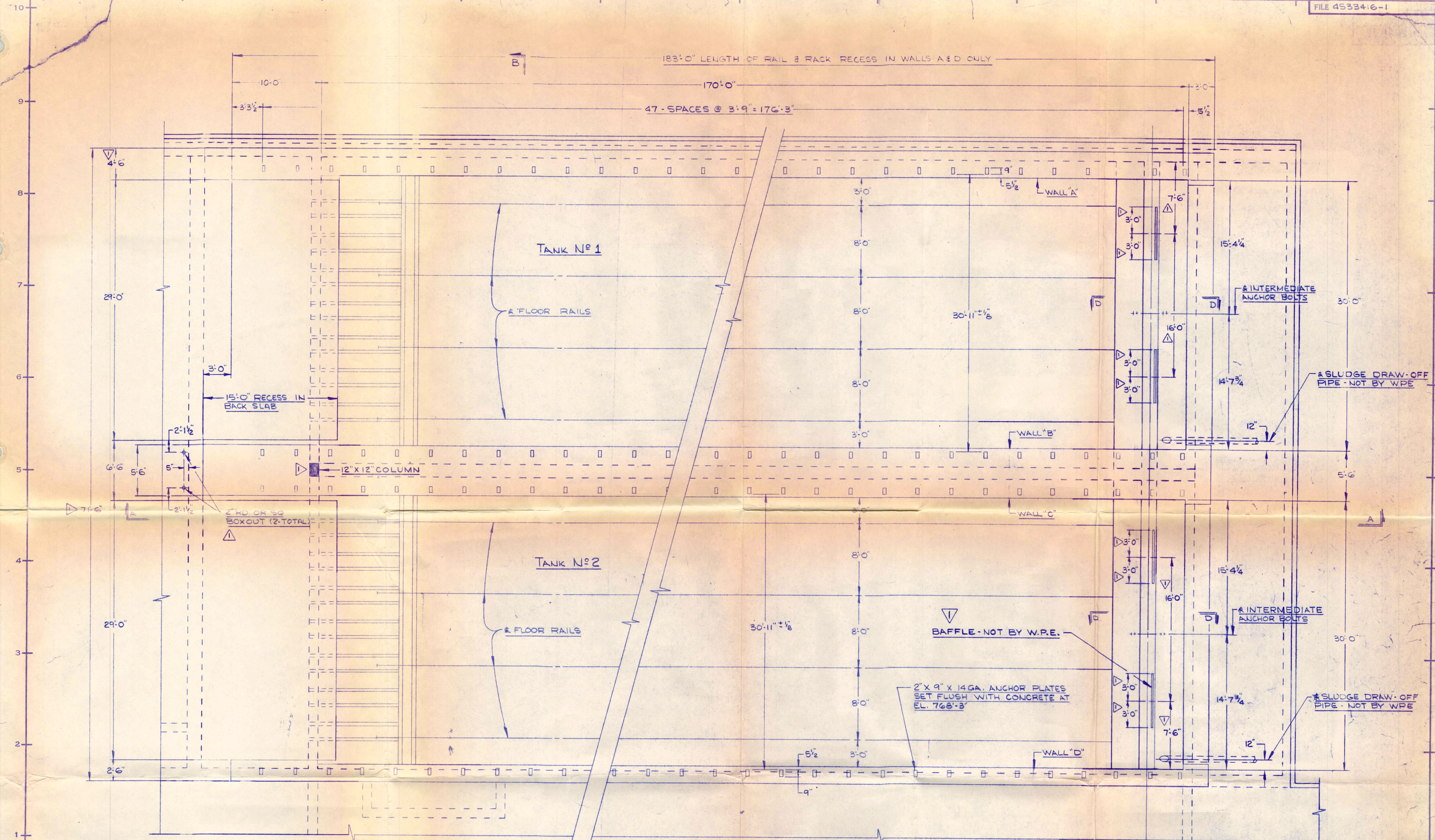
CHANGED 1.8" TO 1.5" CR 11-15-71

SUBSTITUTION OF GINCH ANCHORS, EXPANSION SHIELDS, STUDS SET PLUGS AND ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

DATE	BY	WALKER PROCESS EQUIPMENT
10-7-71	CR	DIVISION OF CHICAGO BRIDGE & IRON CO.
10-13-71	APPR.	HEALTHICKENER
	APPR.	DRIVE ASSEMBLY
	APPR.	

SCALE: 3" = 1'-0"

CONTRACT FILE 3533496-1



PLAN VIEW

* BUOYANT HELITHICKENER FOR ANCHORAGE BELOW EL. 763'-3" SEE 4S33417

△ SUBSTITUTION OF CINCH ANCHORS, EXPANSIONS SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE FLOURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

△	ADD 12' X 12" COLUMN, RELOCATED	
	2-2" SQ. OR RD. BOXOUT, REVISED	
	BAFFLE AND ADDED NEW DIMS.	
	LOCATING BAFFLES	CR 1/28/72
NO.	REVISIONS	DATE

THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT.
REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

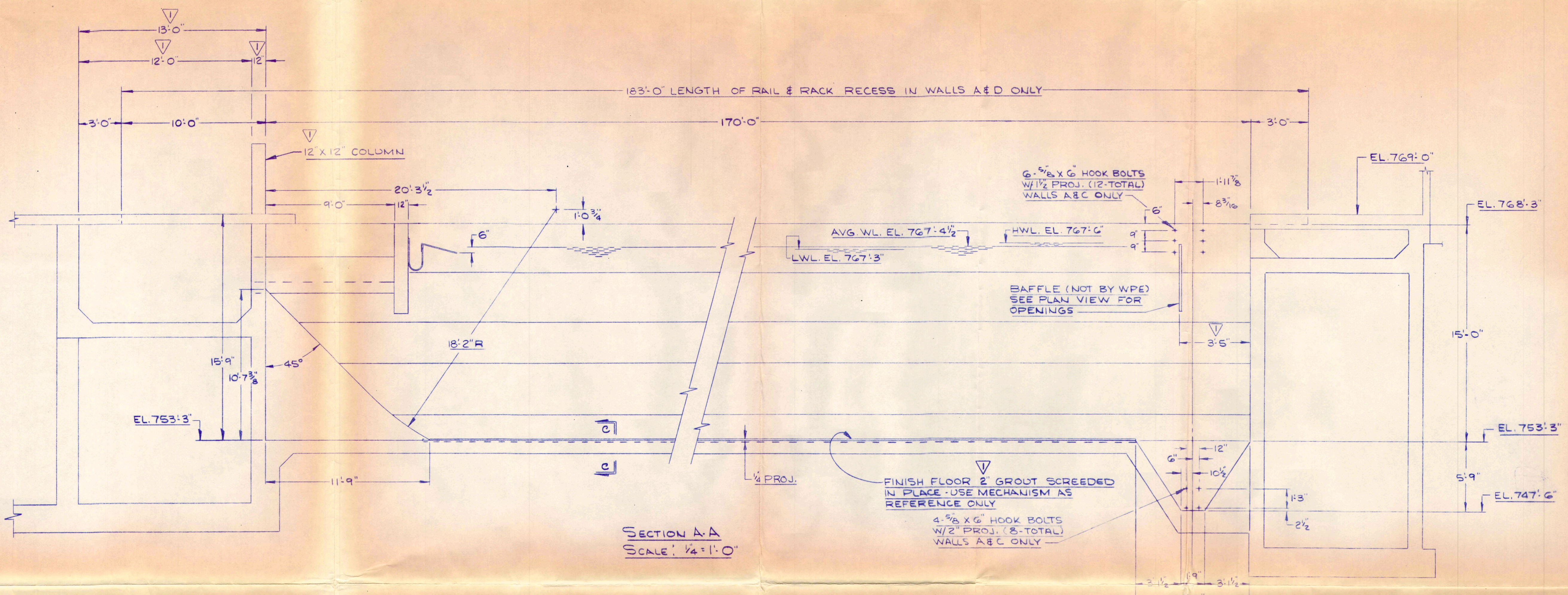
	DATE	BY
DRAWN	9-22-71	CR
CHECKED	9-27-71	CR
APPR.		
SCALE	3/16" = 1'-0"	

WALKER PROCESS EQUIPMENT
DIVISION OF CHICAGO BRIDGE & IRON CO.
AURORA, ILL., U.S.A.

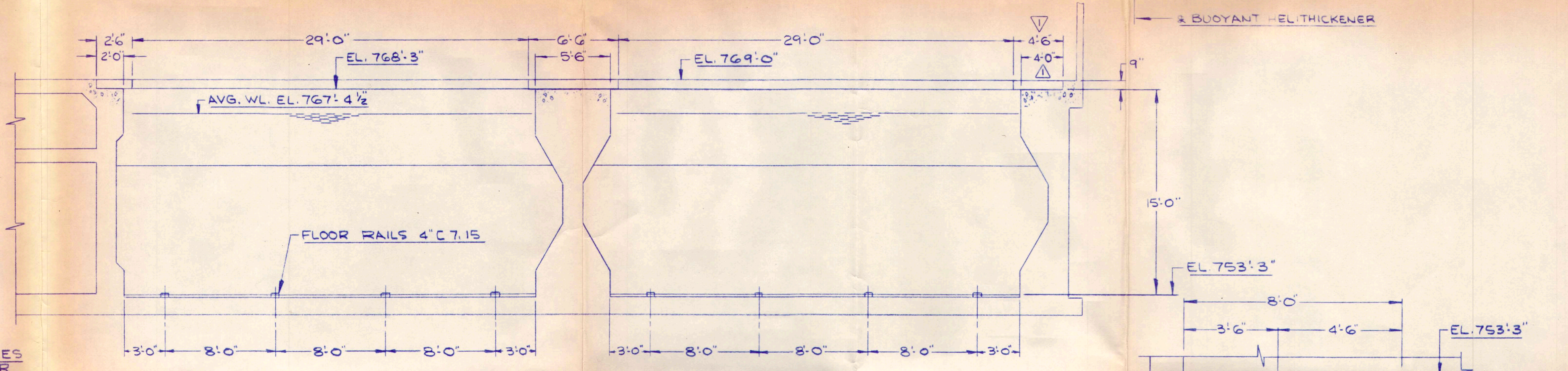
FOUNDATION LAYOUT
COG BRIDGE
WINNIPEG, MANITOBA

CONTRACT 71-W352W
71-W353W

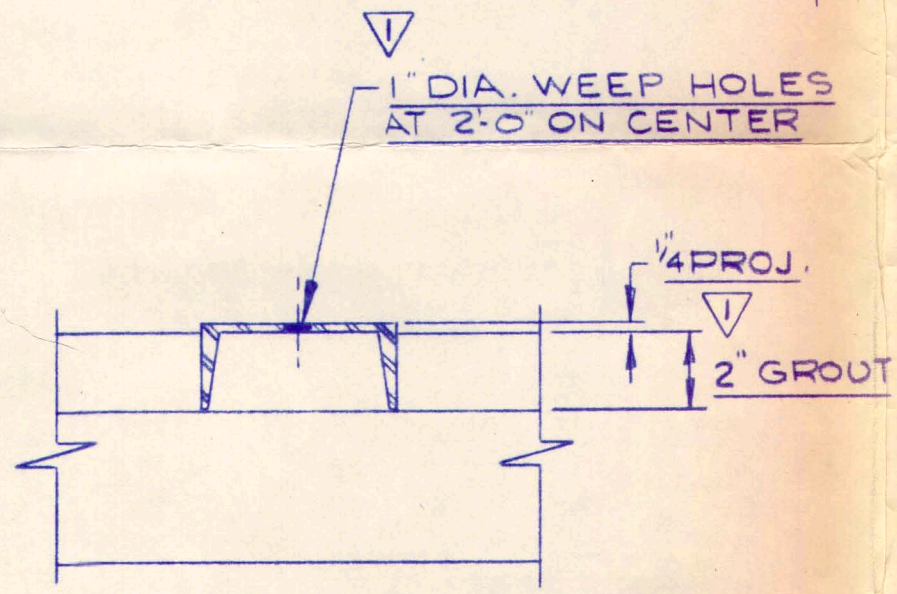
FILE 4S33416-1



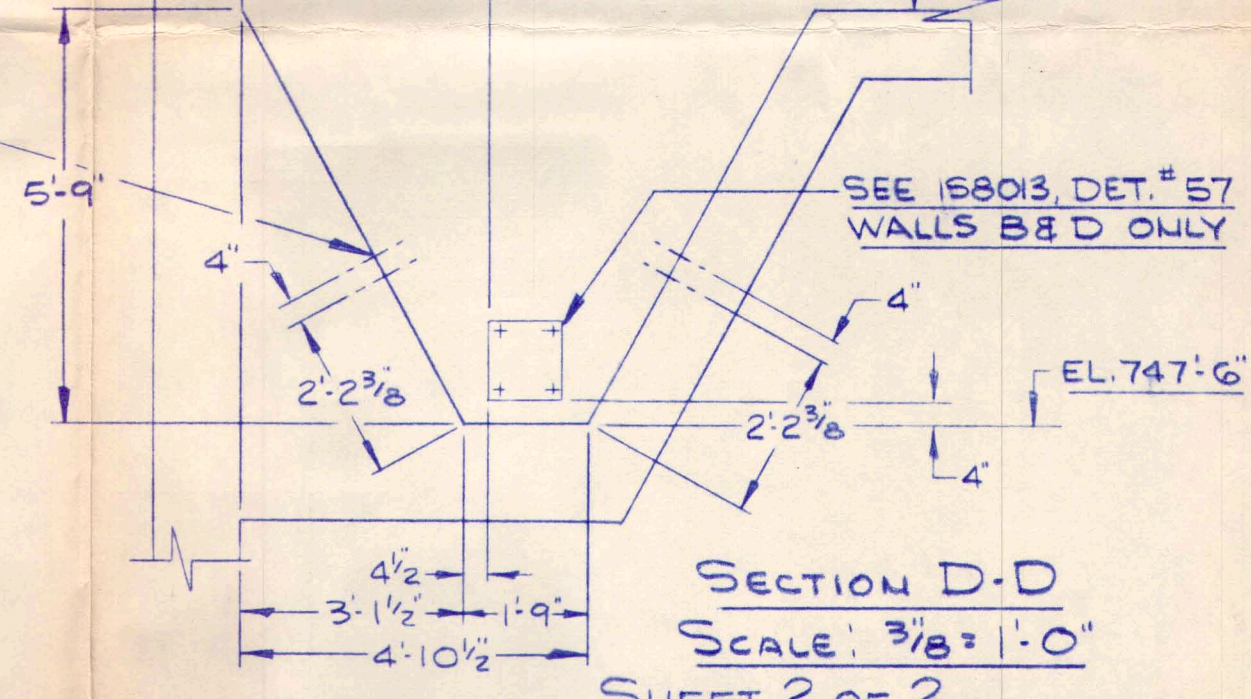
SECTION A-A
SCALE: 1/4" = 1'-0"



SECTION B-B
SCALE: 3/16" = 1'-0"



SECTION C-C



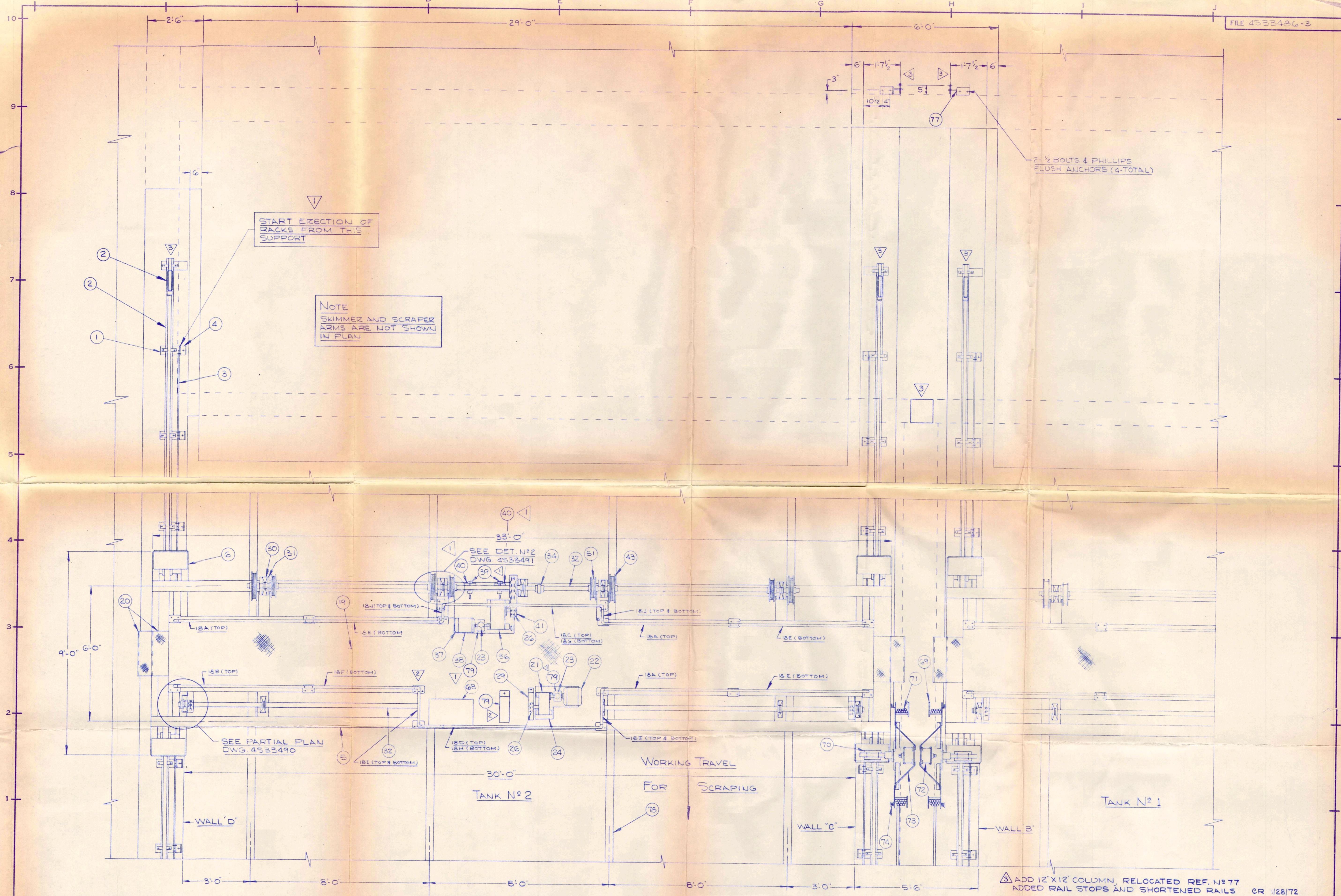
SECTION D-D
SCALE: 3/8" = 1'-0"

SUBSTITUTION OF CINCH ANCHORS, EXPANSION SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

ADDED DIMS. 12'-0", 12" AND 13'-0"		
3'-5" WAS 5'-0", 4'-0" WAS 3'-0", 4'-6"		
WAS 3'-6", ADDED NOTED IN SECTION C-C, 2" GROUT WAS		
1 1/2" GROUT, ADDED COLUMN	CR	1/28/72
NO.	REVISIONS	DATE

THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT.
REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

DATE	BY	WALKER PROCESS EQUIPMENT DIVISION OF CHICAGO BRIDGE & IRON CO. AURORA, ILL., U.S.A.
9-22-71	CR	
CHECKED	9-27-71	2/EFJ
APPR.		
APPR.		
SCALE SHOWN	CONTRACT	FILE 4533417-1



START ERECTION OF RACKS FROM THIS SUPPORT

NOTE
SKIMMER AND SCRAPER ARMS ARE NOT SHOWN IN PLAN

2-1/2 BOLTS & PHILLIPS
FLUSH ANCHORS (4-TOTAL)

SEE PARTIAL PLAN
DWG. 4533490

SEE DET. N°2
DWG. 4533491

ADD 12"X12" COLUMN, RELOCATED REF. N°77
ADDED RAIL STOPS AND SHORTENED RAILS CR 1/28/72

PLAN VIEW

ADDED HANDRAIL MARK N°5

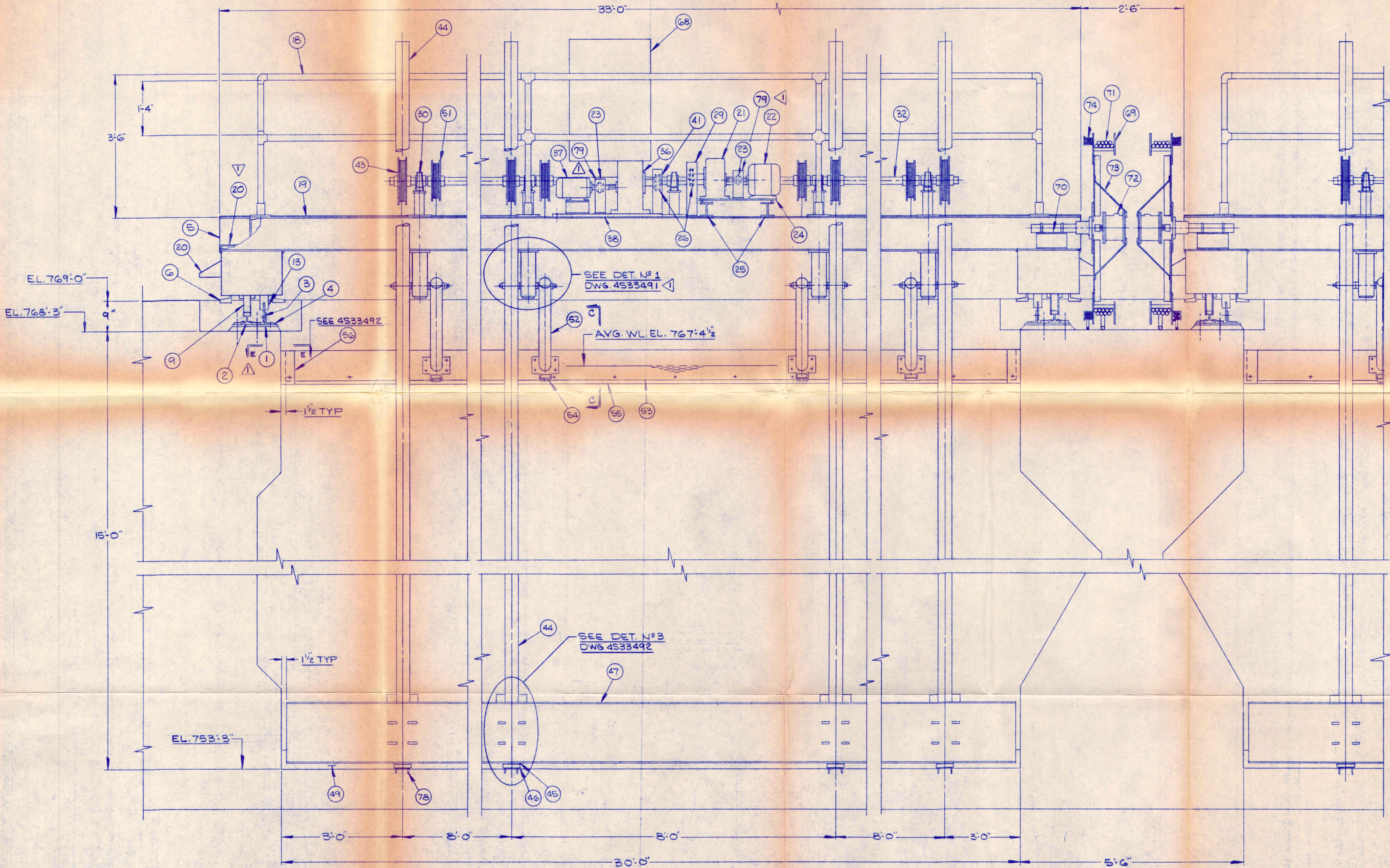
SUBSTITUTION OF CINCH ANCHORS, EXPANSIONS SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

NO.	REVISIONS	DATE
1	ADDED NOTE AT REF'S C-B, ADDED COUPLING GUARD REF (79), ADDED REF. N°s (39) & (40)	CR 10-13-71
2	REVISED HANDRAIL ON DRIVE SIDE, ADDED COUPLING GUARD.	CR 11-2-71

THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT.
REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

DATE	BY
DRAWN 10-6-71	CR
CHECKED 10-13-71	2/5j
APPR.	

WALKER PROCESS EQUIPMENT
DIVISION OF CHICAGO BRIDGE & IRON CO.
AURORA, ILL., U.S.A.
TYPICAL ASSEMBLY
TRAVELING BRIDGE
TYPE "CB"
SCALE 1/2"=1'-0"
CONTRACT 71-W352W
FILE 4533486-3



SECTIONAL ELEVATION

99A 4100 6A

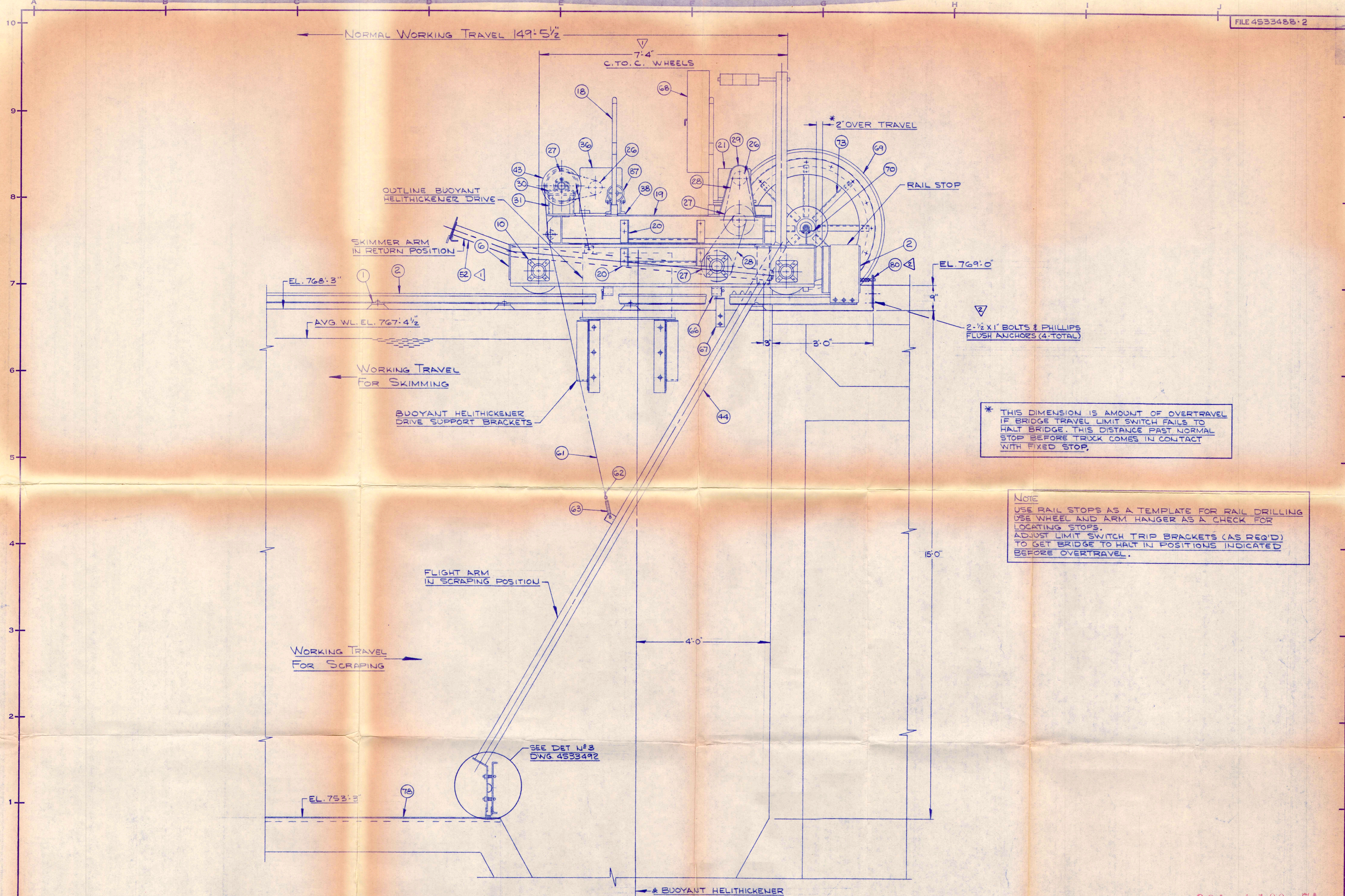
SUBSTITUTION OF CINCH ANCHORS, EXPANSIONS SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

NO.	REVISIONS	DATE

THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT.
REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

DRAWN	DATE	BY
CHECKED	10-13-71	CR
APPR.		
SCALE	3/4" = 1'-0"	

WALKER PROCESS EQUIPMENT	
DIVISION OF CHICAGO BRIDGE & IRON CO.	
ALURORA, ILL., U.S.A.	
TYPICAL ASSEMBLY	
FOR TRAVELING BRIDGE TYPE "CB"	
CONTRACT	71-W352W
FILE	4533487-1



* THIS DIMENSION IS AMOUNT OF OVERTRAVEL IF BRIDGE TRAVEL LIMIT SWITCH FAILS TO HALT BRIDGE. THIS DISTANCE PAST NORMAL STOP BEFORE TRUCK COMES IN CONTACT WITH FIXED STOP.

NOTE
 USE RAIL STOPS AS A TEMPLATE FOR RAIL DRILLING
 USE WHEEL AND ARM HANGER AS A CHECK FOR LOCATING STOPS.
 ADJUST LIMIT SWITCH TRIP BRACKETS (AS REQ'D) TO GET BRIDGE TO HALT IN POSITIONS INDICATED BEFORE OVERTRAVEL.

SECTIONAL ELEVATION

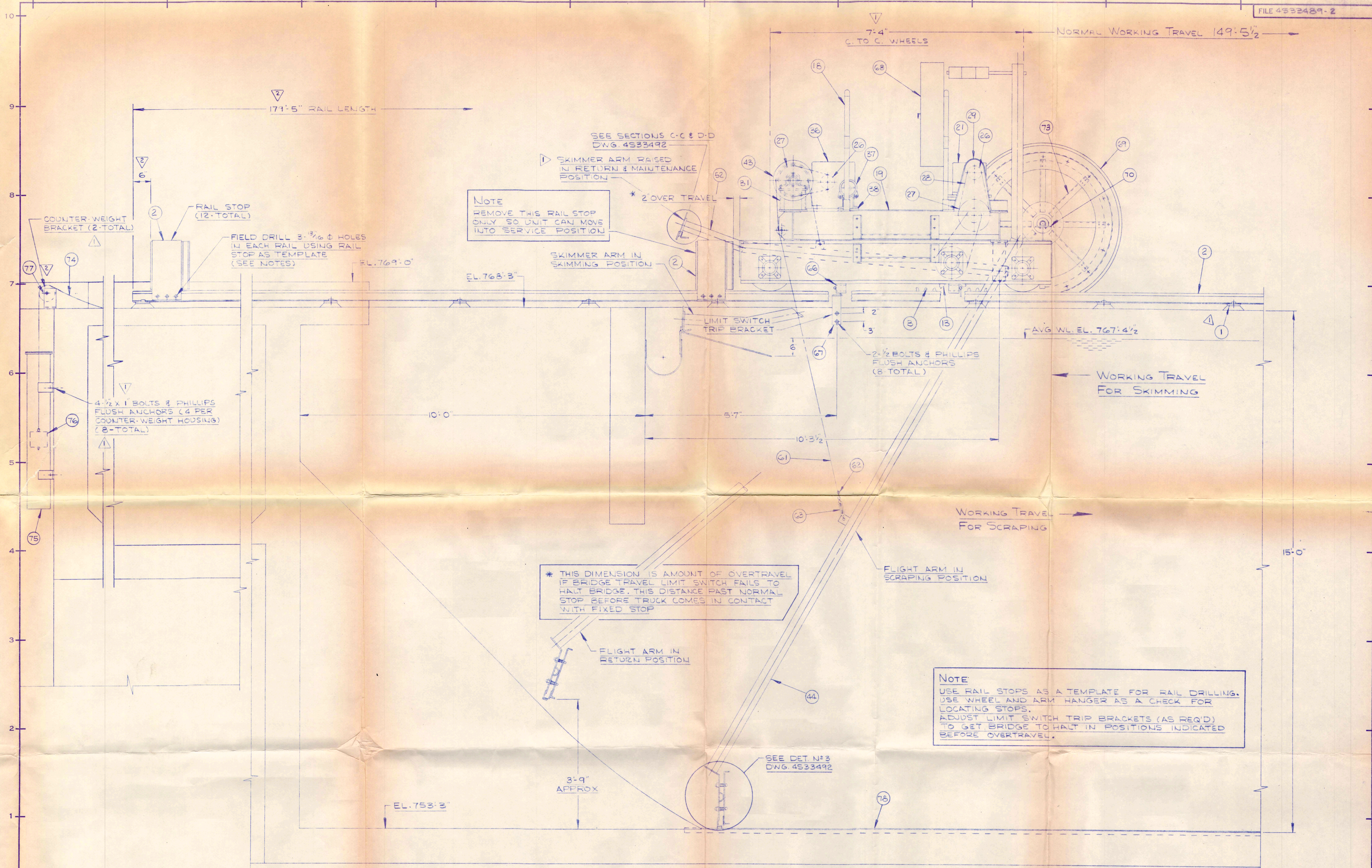
SUBSTITUTION OF CINCH ANCHORS, EXPANSION SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

NO.	REVISIONS	DATE
	CHANGED 9'-0" TO 7'-4", RAISED REF. N ^o 2 TO RETURN POSITION CR 10-13-71	
	REF. N ^o 80 ADDED 8 ANCHORS CR 11-3-71	

THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT.
 REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

DATE	BY	WALKER PROCESS EQUIPMENT DIVISION OF CHICAGO BRIDGE & IRON CO. AURORA, ILL., U.S.A. TYPICAL ASSEMBLY FOR TRAVELING BRIDGE TYPE "CB"
DRAWN	CR	
CHECKED	CR	
APPR.		
APPR.		
SCALE 3/4" = 1'-0"		CONTRACT 71-W352W
		FILE 4533488-2

99A 4100 7A



NOTE
REMOVE THIS RAIL STOP ONLY SO UNIT CAN MOVE INTO SERVICE POSITION

* THIS DIMENSION IS AMOUNT OF OVERTRAVEL IF BRIDGE TRAVEL LIMIT SWITCH FAILS TO HALT BRIDGE. THIS DISTANCE PAST NORMAL STOP BEFORE TRUCK COMES IN CONTACT WITH FIXED STOP

NOTE
USE RAIL STOPS AS A TEMPLATE FOR RAIL DRILLING. USE WHEEL AND ARM HANGER AS A CHECK FOR LOCATING STOPS. ADJUST LIMIT SWITCH TRIP BRACKETS (AS REQ'D) TO GET BRIDGE TO HALT IN POSITIONS INDICATED BEFORE OVERTRAVEL.

SECTIONAL ELEVATION

SUBSTITUTION OF CINCH ANCHORS, EXPANSION SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

- ▲ CHANGED 4-1/2 X 4" BOLTS TO 4-1/2 X 1" BOLTS, CHANGED 16 TOTAL TO 8-TOTAL AT REF. A-5 1/2
- ▲ RELOCATED REF. 75, 76 & 77, 6" DIM. WAS 171'-5" WAS 182'-0", RELOCATED RAIL STOP REF. 2 CR 1/28/72

NO.	REVISIONS	DATE
1	REMOVED NOTE AT REF. F-9 1/2, REVISED NOTE AT REF. E-8 1/4, CHANGED 9'-0" TO 7'-4", ADDED 1" DIM.	
2	CHANGED 4-TOTAL TO 2-TOTAL AT REF. A-7 1/2	CR 10-13-71

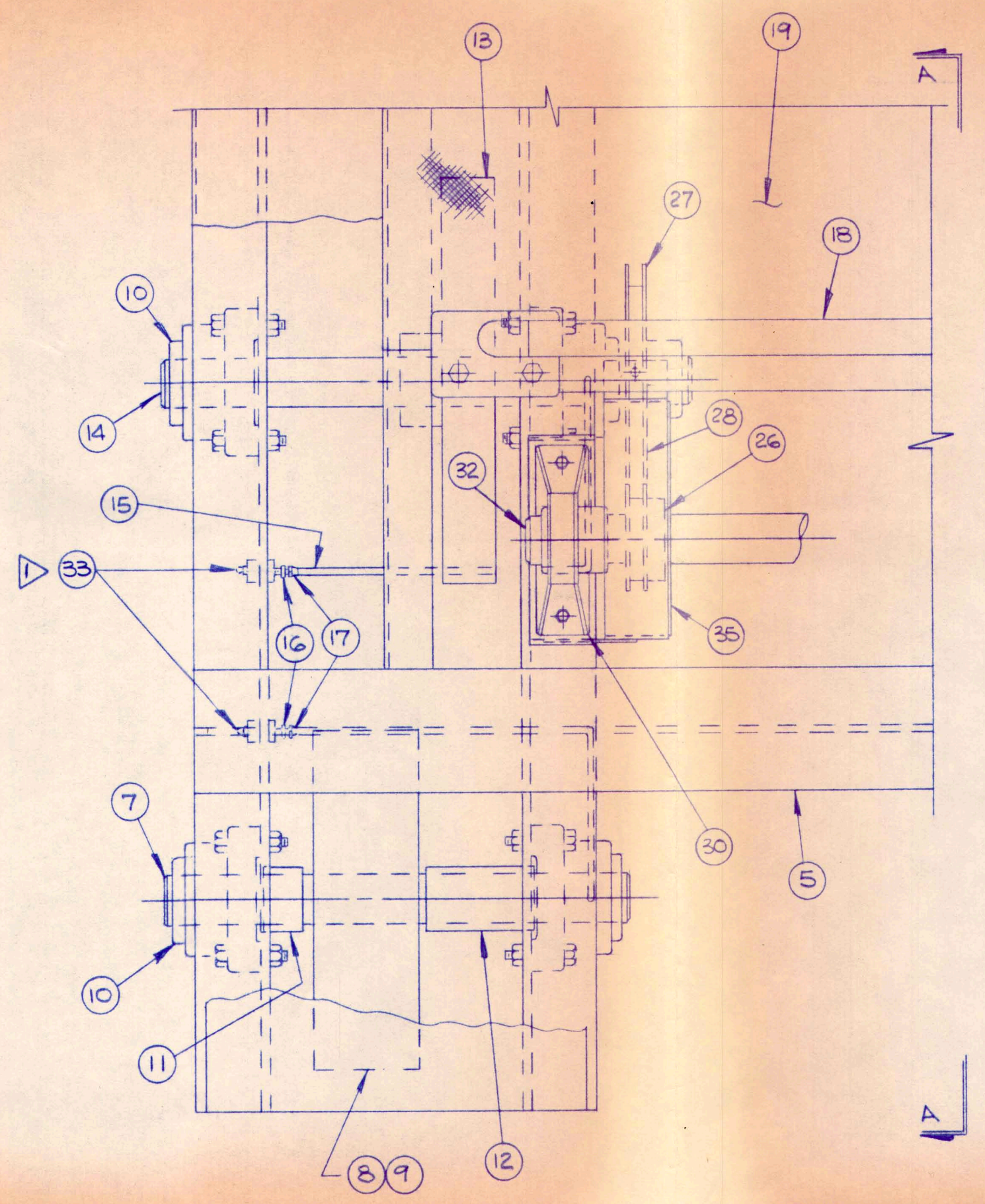
THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT.
REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

DATE	BY
10-6-71	CR
10-13-71	CR

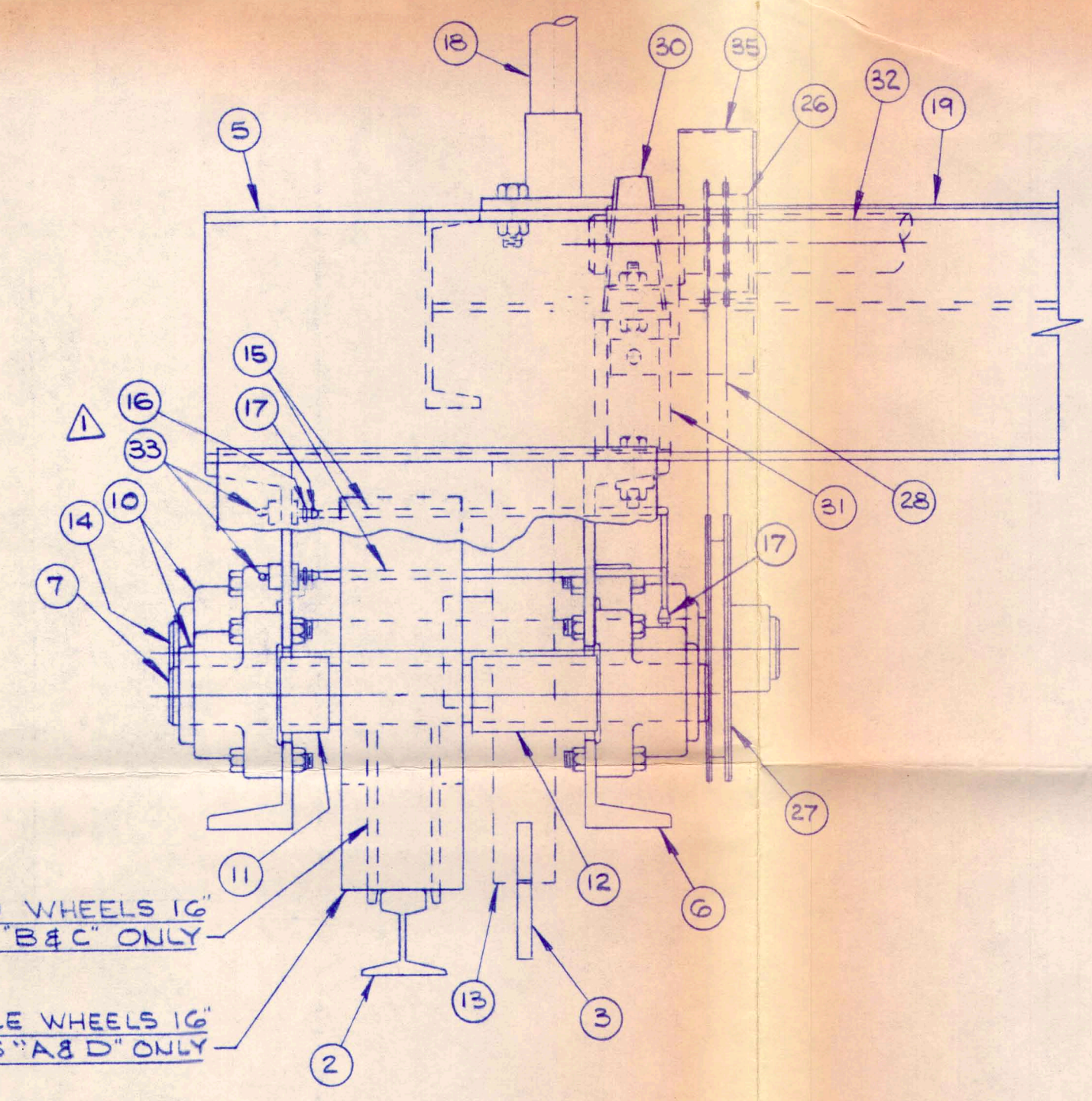
WALKER PROCESS EQUIPMENT
DIVISION OF CHICAGO BRIDGE & IRON CO.
AURORA, ILL., U.S.A.
TYPICAL ASSEMBLY
FOR
TRAVELING BRIDGE TYPE "CB"
CONTRACT 71-W352W FILE 4533489-2

ASSEMBLY LIST

- 1 BASE PLATES
- 2 RAILS 40# YD. A.S.C.E., RAILS STOPS & CLIPS
- 3 RACK
- 4 RACK SUPPORTS
- 5 BRIDGE
- 6 TRUCKS
- 7 WHEEL SHAFTS 2 7/16" Φ
- 8 FLANGE WHEELS 16"
- 9 FLAT WHEELS 16"
- 10 DODGE TYPE "E" FLANGE BEARINGS 2 7/16" Φ
- 11 SPACER 2 1/2" Φ PIPE X 2' LG.
- 12 SPACER 2 1/2" Φ PIPE X 5' LG.
- 13 PINION - 17 T., 16.234" P.C.
- 14 PINION SHAFTS 2 7/16" Φ
- 15 GREASE LINE 1/4" Φ COPPER
- 16 MALE COUPLING 1/4" CHASE
- 17 SHORT NUT 1/4" CHASE
- 18 HANDRAILS 1 1/2" STD. WT. PIPE - GALV
- 19 DECK PLATES 3/16" GALV
- 20 TRUCK STEPS
- 21 MAIN DRIVE REDUCER - 5 DBI
- 22 MAIN DRIVE MOTOR 1 HP.
- 23 DODGE POLYFLEX COUPLING
- 24 DRIVE BASE
- 25 DRIVE BASE SUPPORTS
- 26 DRIVE SPROCKET 19 T, 4.557" PD, 3/4 P, DOUBLE STRAND
- 27 DRIVEN SPROCKET 45 T, 10.752" PD, 3/4, DOUBLE STRAND
- 28 ROLLER CHAIN 3/4 PITCH DOUBLE STRAND
- 29 MAIN DRIVE CHAIN GUARD
- 30 DODGE SX PILLOW BLOCKS 2 7/16" Φ
- 31 PILLOW BLOCK BEARING PEDESTAL
- 32 DRIVE LINE SHAFT 2 7/16" Φ
- 33 GREASE FITTINGS
- 34 LOVEJOY FLEXIBLE GEAR COUPLING 2 7/16" Φ
- 35 DRIVE SPROCKET CHAIN GUARD
- 36 HOIST DRIVE REDUCER - GDBI
- 37 HOIST DRIVE MOTOR 1 1/2 HP.
- 38 DRIVE BASE
- 39 DRIVE BASE ADJUSTING BOLTS
- 40 ADJUSTING BOLT SUPPORT ANGLE
- 41 HOIST DRIVE UNIT CHAIN GUARD
- 42 ARM HANGER 4" STD. WT. PIPE
- 43 SCRAPING FLIGHT ARM DRUM 12" DRUM DIA.
- 44 SCRAPING FLIGHT ARM 3 1/2" STD. WT. PIPE
- 45 WEARING SHOE BRACKET
- 46 POLYURETHANE WEARING SHOE
- 47 FLIGHT 1/4" STL. R.
- 48 TENSION SPRINGS
- 49 NEOP. WIPER 1/2" X 6"
- 50 BACK-UP BAR 10 GA. X 4" WIDE
- 51 SKIMMER ARM DRUM 9 3/4" DRUM DIA.
- 52 SKIMMER ARM 3" SCHED. 10 PIPE
- 53 SKIMMER FLIGHT 1/4" X 9" STL. R.
- 54 OVER RIDE BAR
- 55 NEOP. WIPER 3/8" X 3"
- 56 END WIPER 3/8" X 4"
- 57 BACK-UP BAR 10 GA. X 2"
- 58 END BACK-UP BAR 10 GA. X 2 1/2"
- 59 SCRAPING & SKIMMER ARM PIN 1 7/16" Φ STN. STL.
- 60 SCHNITZER SHAFT COLLARS 1 7/16" Φ STN. STL.
- 61 CABLE 1/2" Φ STN. STL.
- 62 CROSBY CLIPS & WIRE ROPE THIMBLE STN. STL.
- 63 TORNBUCKLE
- 64 SKIMMER ARM HOOK
- 65 SKIMMER ARM HOOK BRACKET
- 66 LIMIT SWITCH
- 67 LIMIT SWITCH BRACKET
- 68 ELECTRICAL CONTROL PANEL
- 69 POWER REEL
- 70 POWER REEL SUPPORT 8" WF 17"
- 71 ELECTRIC POWER CORD
- 72 COLLECTOR RING
- 73 COLLECTOR RING SUPPORTS
- 74 TENSION CABLE 1/8" STN. STL.
- 75 COUNTERWEIGHT
- 76 COUNTERWEIGHT HOUSING
- 77 TENSION CABLE GUIDE
- 78 FLOOR RAILS 4" C 7.15"
- 79 COUPLING COVER
- 80 ELECTRICAL BRACKET



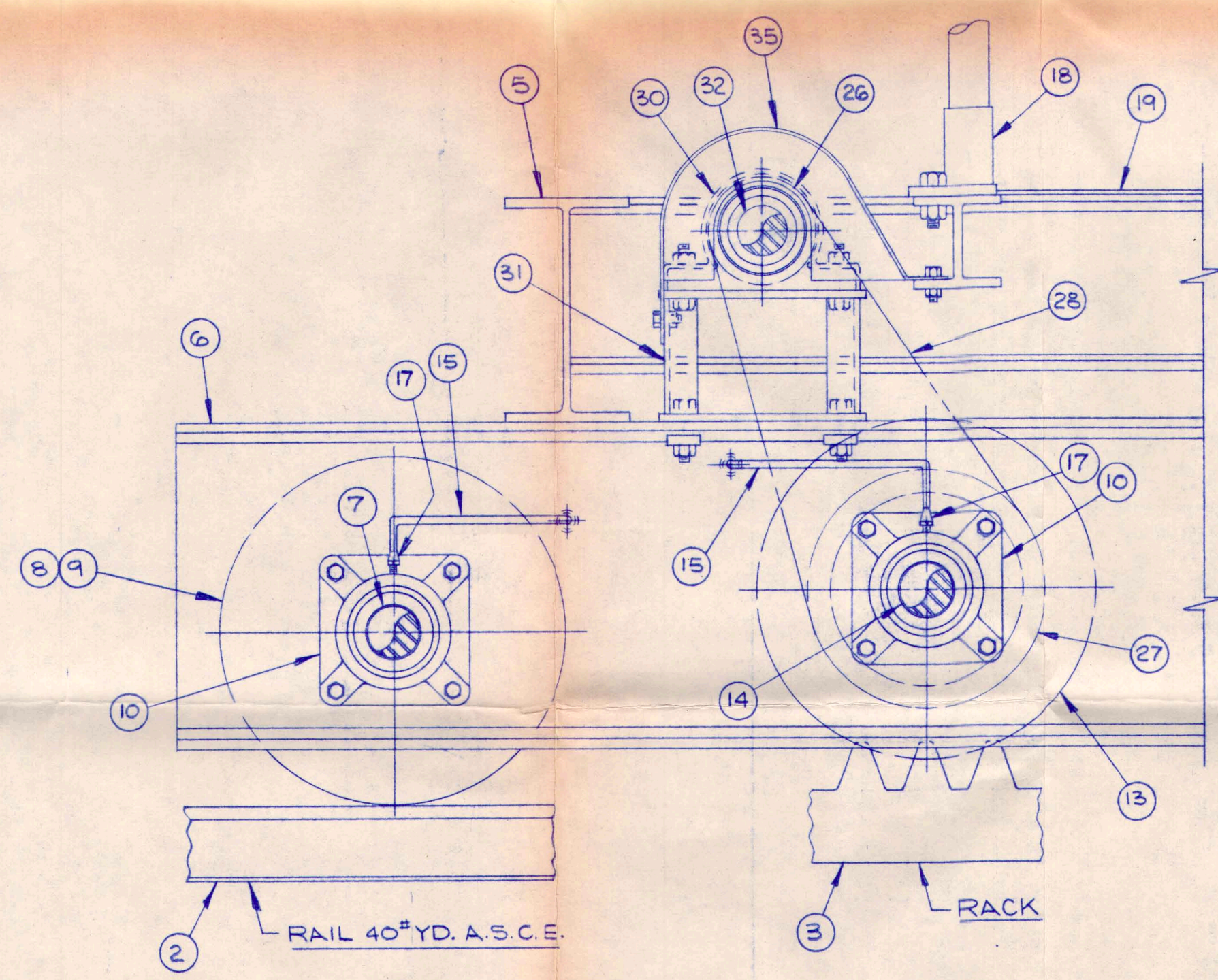
PARTIAL PLAN OF TRUCK AT WALL "A & D" ONLY



8 FLANGED WHEELS 16" ON WALLS "B & C" ONLY

9 FLAT FACE WHEELS 16" ON WALLS "A & D" ONLY

NOTE
FOR ORIENTATION OF PARTIAL PLAN
SEE DWG. N^o 453348 G



VIEW A-A

SUBSTITUTION OF CINCH ANCHORS, EXPANSION SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

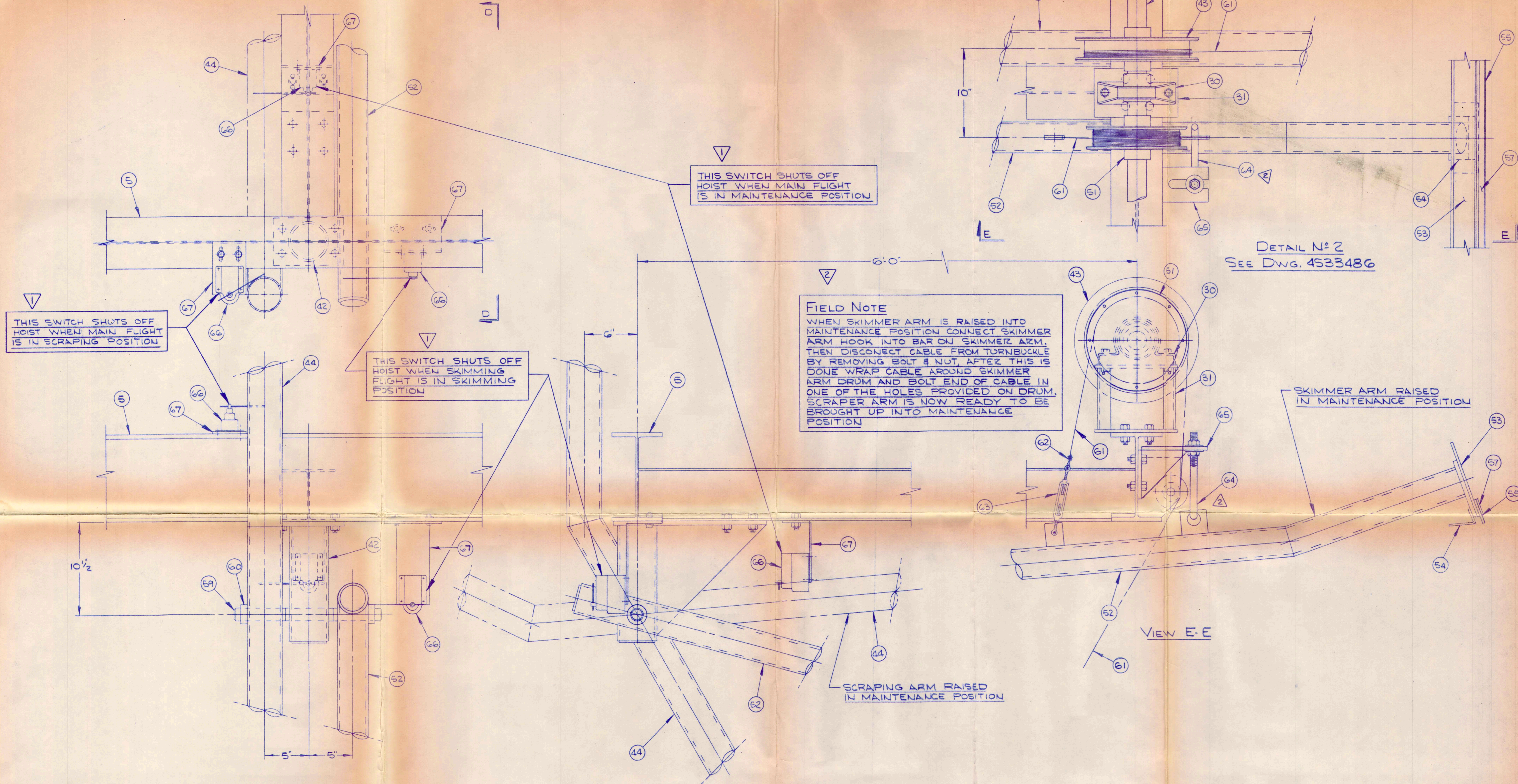
REF. N^o 80 ADDED CR 11-3-71

NO.	REVISIONS	DATE
1	REF. N ^o s (1)(2)(3)(5)(21)(22)(27)(30)(31)(51)(52) WERE REVISED, CHANGED REF. N ^o s	
2	DODGE SPLIT IRON COLLARS 2 7/16" Φ TO GREASE FITTINGS, ADDED REF. N ^o 19 COUPLING COVER	CR 10-13-71

THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT.
REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

DATE	BY
10-6-71	CR
10-13-71	J/E

99A 4100 9A
WALKER PROCESS EQUIPMENT
DIVISION OF CHICAGO BRIDGE & IRON CO.
AURORA, ILL., U.S.A.
TYPICAL ASSEMBLY
FOR
TRAVELING BRIDGE TYPE "CB"
SCALE 2" = 1'-0"
CONTRACT 71-W352W FILE 4533490-2



THIS SWITCH SHUTS OFF HOIST WHEN MAIN FLIGHT IS IN SCRAPING POSITION

THIS SWITCH SHUTS OFF HOIST WHEN MAIN FLIGHT IS IN MAINTENANCE POSITION

THIS SWITCH SHUTS OFF HOIST WHEN SKIMMING FLIGHT IS IN SKIMMING POSITION

FIELD NOTE
 WHEN SKIMMER ARM IS RAISED INTO MAINTENANCE POSITION CONNECT SKIMMER ARM HOOK INTO BAR ON SKIMMER ARM. THEN DISCONNECT CABLE FROM TURNBUCKLE BY REMOVING BOLT & NUT, AFTER THIS IS DONE WRAP CABLE AROUND SKIMMER ARM DRUM AND BOLT END OF CABLE IN ONE OF THE HOLES PROVIDED ON DRUM. SCRAPER ARM IS NOW READY TO BE BROUGHT UP INTO MAINTENANCE POSITION

DETAIL N° 2
 SEE DWG. 4533486

DETAIL N° 1
 SEE DWG. 4533487

VIEW D-D

VIEW E-E

SCRAPING ARM RAISED IN MAINTENANCE POSITION

SKIMMER ARM RAISED IN MAINTENANCE POSITION

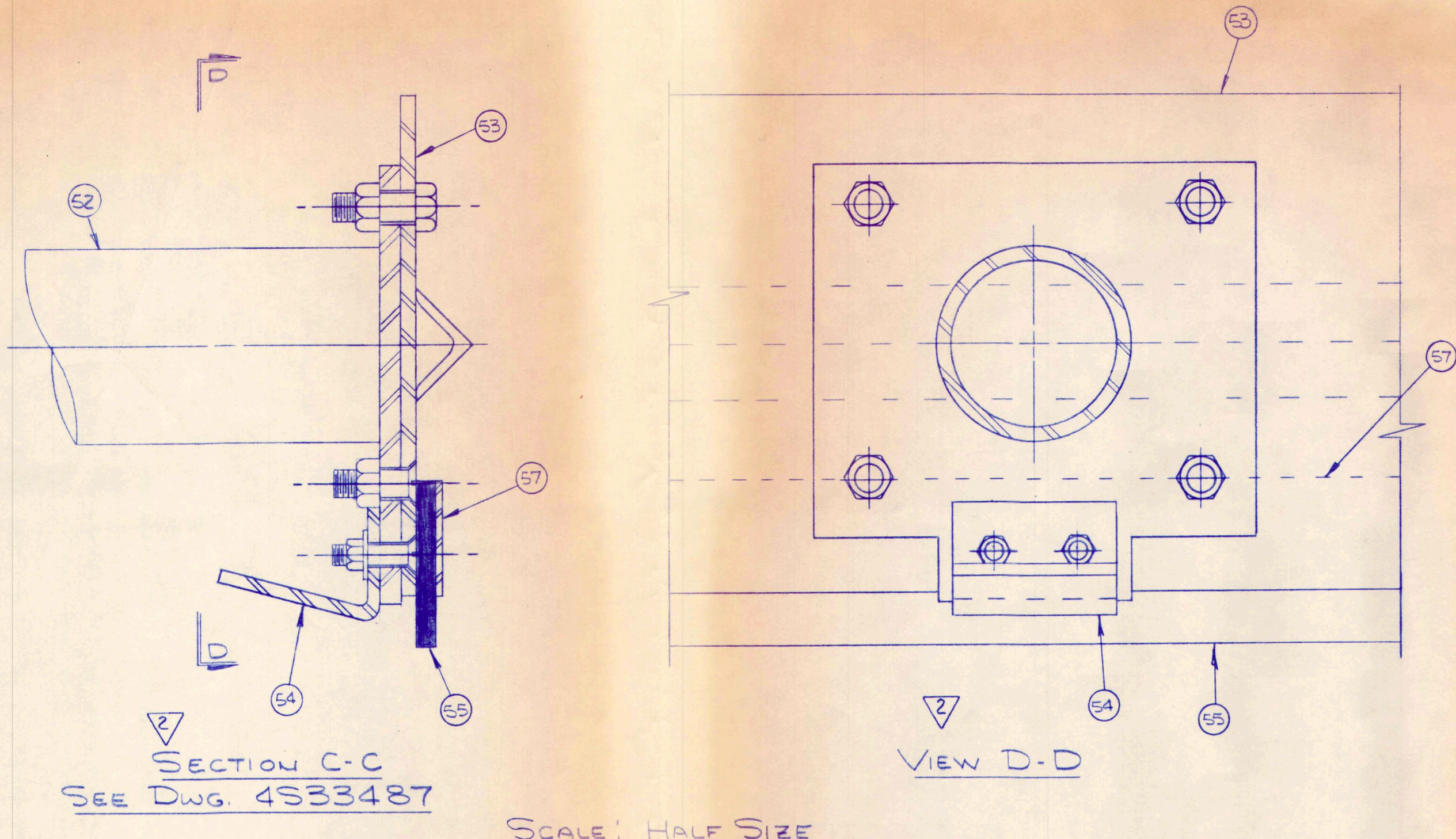
SUBSTITUTION OF CINCH ANCHORS, EXPANSION SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

ADDED NOTES AT REF. A-6 1/2, AT D-6, AT F-8,	CR	10-13-71
FIELD NOTE ADDED, REF. 64 & 65	CR	11-3-71
REVISED	CR	11-3-71
NO.	REVISIONS	DATE

THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT.
 REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

DRAWN	DATE	BY
10-6-71	CR	
CHECKED	DATE	BY
10-13-71	CR	
APPR.		
APPR.		
SCALE 2" = 1'-0"		

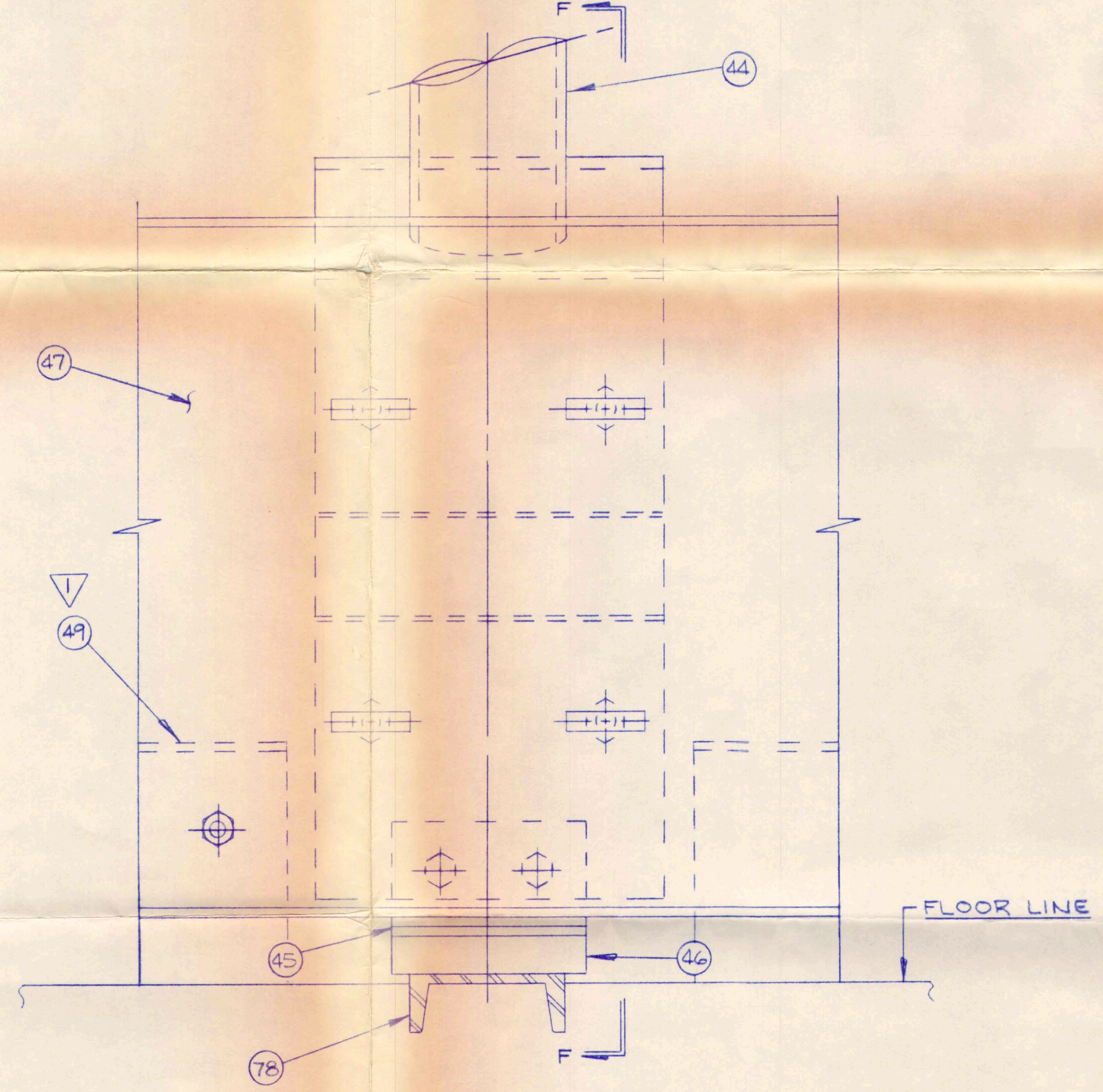
99A 4 100 10B
WALKER PROCESS EQUIPMENT
 DIVISION OF CHICAGO BRIDGE & IRON CO.
 AURORA, ILL., U.S.A.
 TYPICAL ASSEMBLY FOR TRAVELING BRIDGE TYPE "CB"
 CONTRACT 71-W352W FILE 4533491-2



SECTION C-C
SEE DWG. 4533487

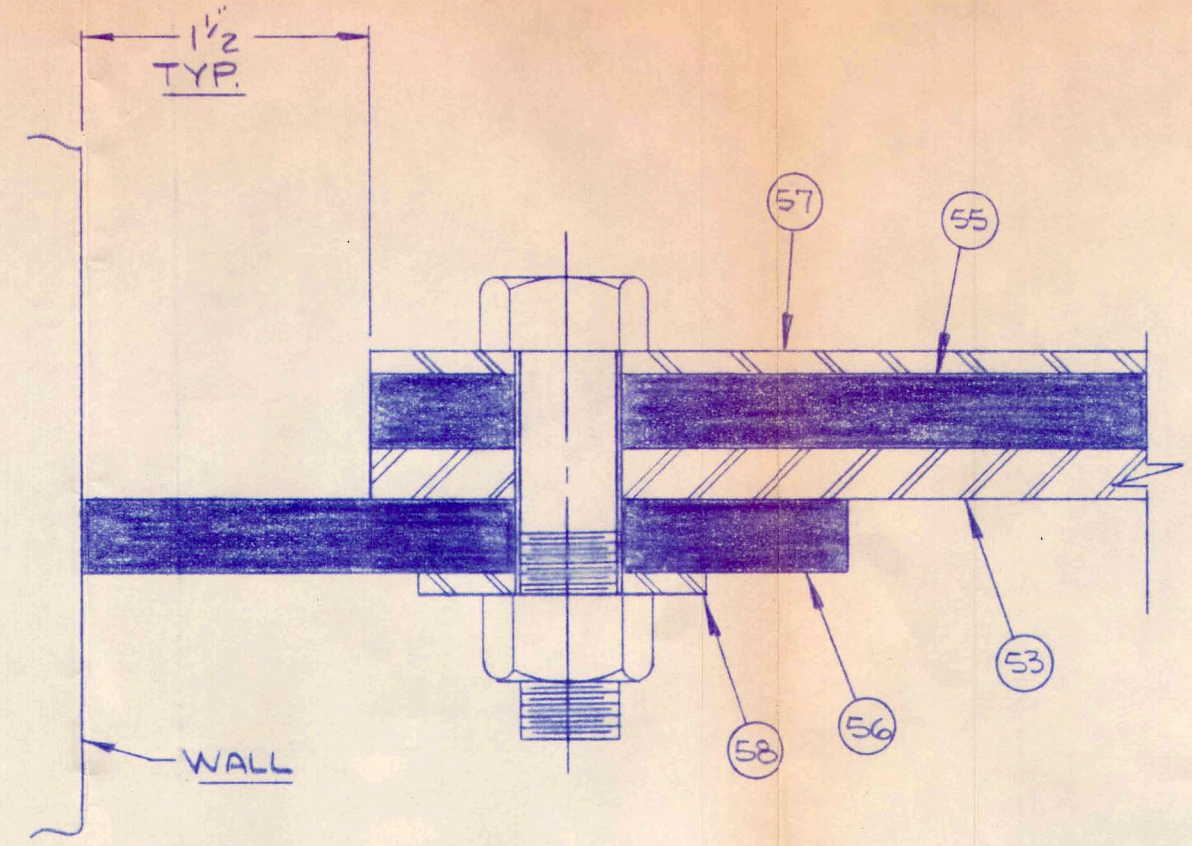
VIEW D-D

SCALE: HALF SIZE

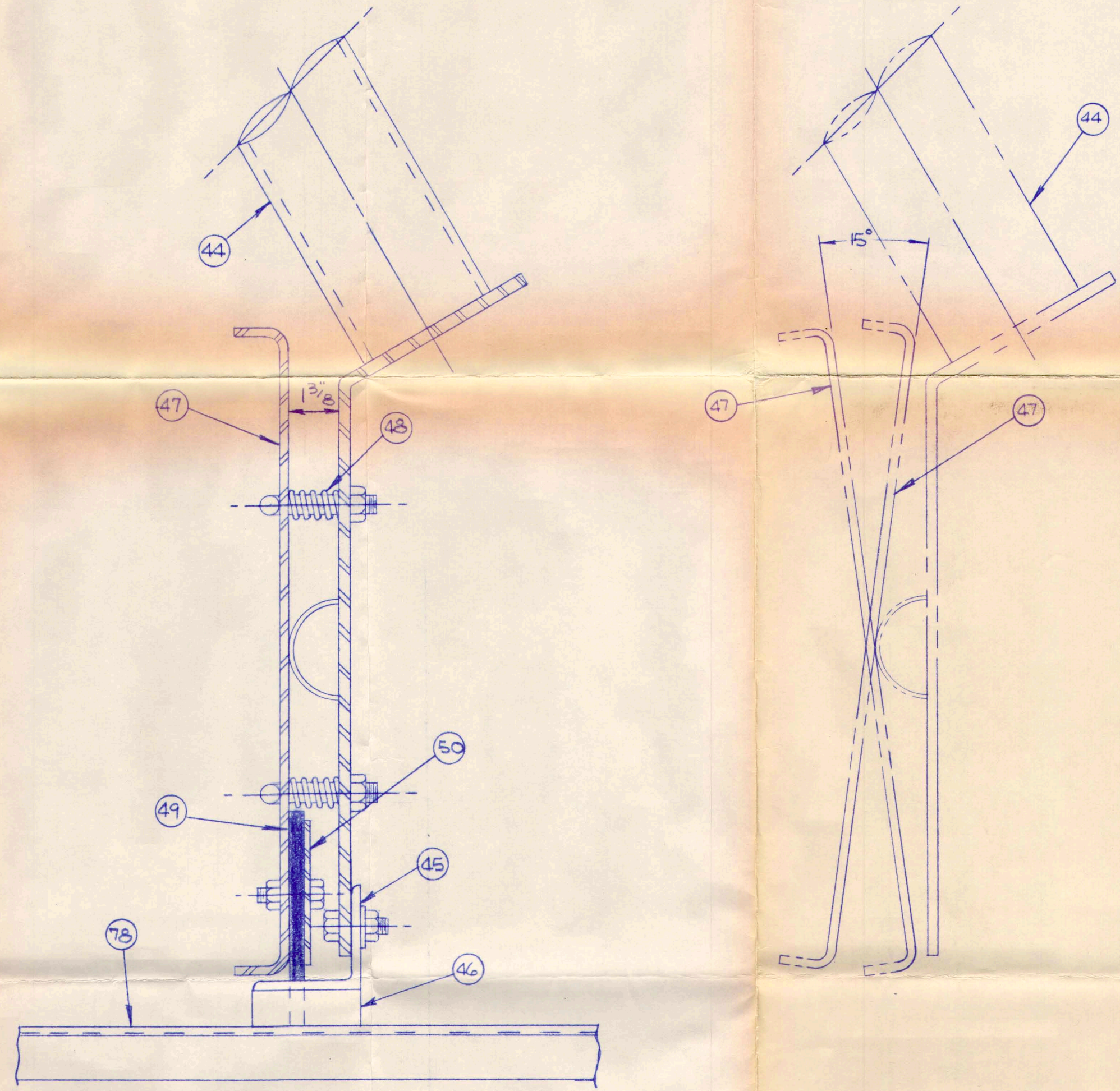


DETAIL N°3
SEE DWG. N° 4533487

SCALE: 4"=1'-0"



SECTION E-E
SEE DWG. 4533487
SCALE: FULL SIZE



SECTION F-F

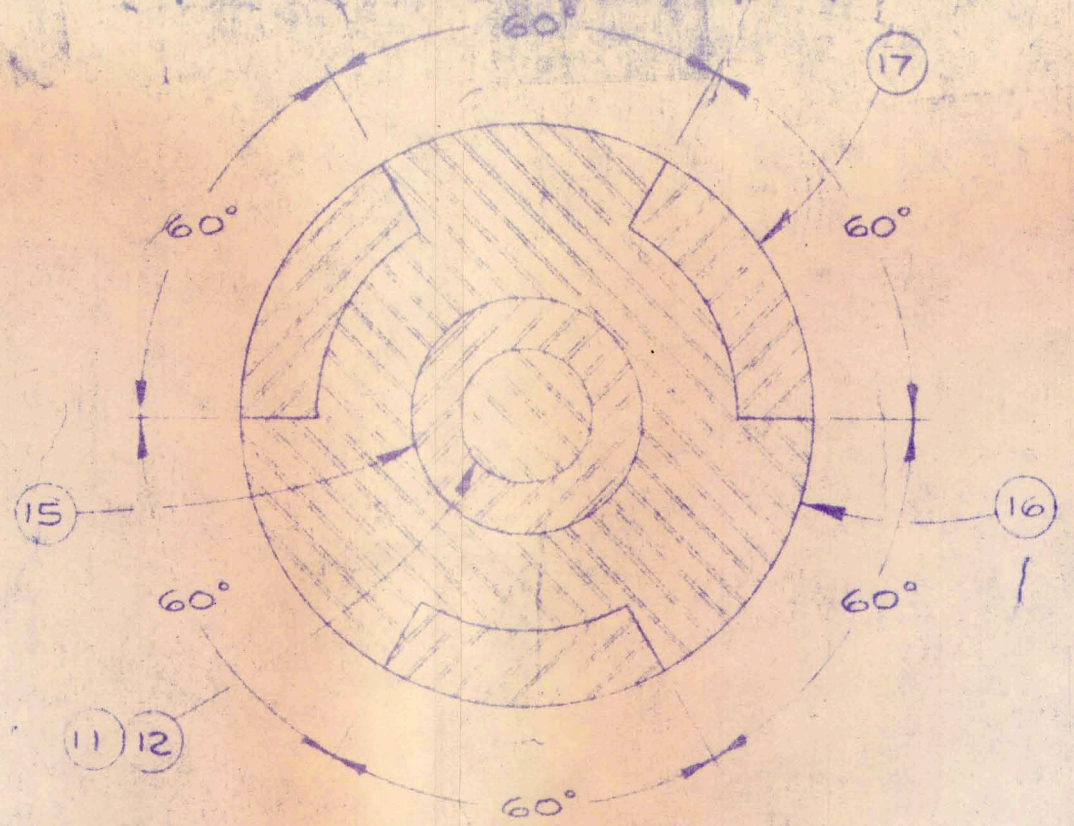
SUBSTITUTION OF CINCH ANCHORS, EXPANSIONS SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

REVISOR	REVISIONS	DATE
CR	REVISED	3-17-72
CR	REVISED REF. N°(49) IN DET. N°3. SECT. CC AND VIEW D-D WERE	10-13-71

THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT. REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

DRAWN	DATE	BY
CR	10-6-71	CR
CHECKED	10-13-71	CR
APPR.		
APPR.		

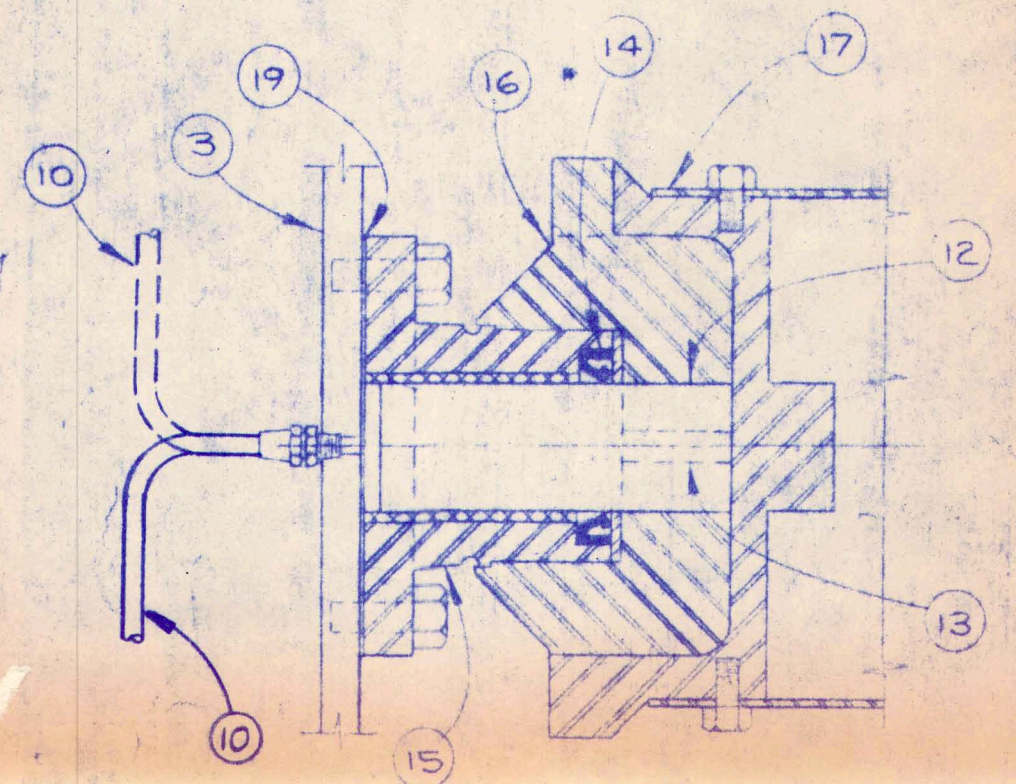
WALKER PROCESS EQUIPMENT
DIVISION OF CHICAGO BRIDGE & IRON CO.
AURORA, ILL., U.S.A.
TYPICAL ASSEMBLY
FOR
TRAVELING BRIDGE TYPE 'CB'
SCALE SHOWN CONTRACT 71-W352W FILE 4533492-2



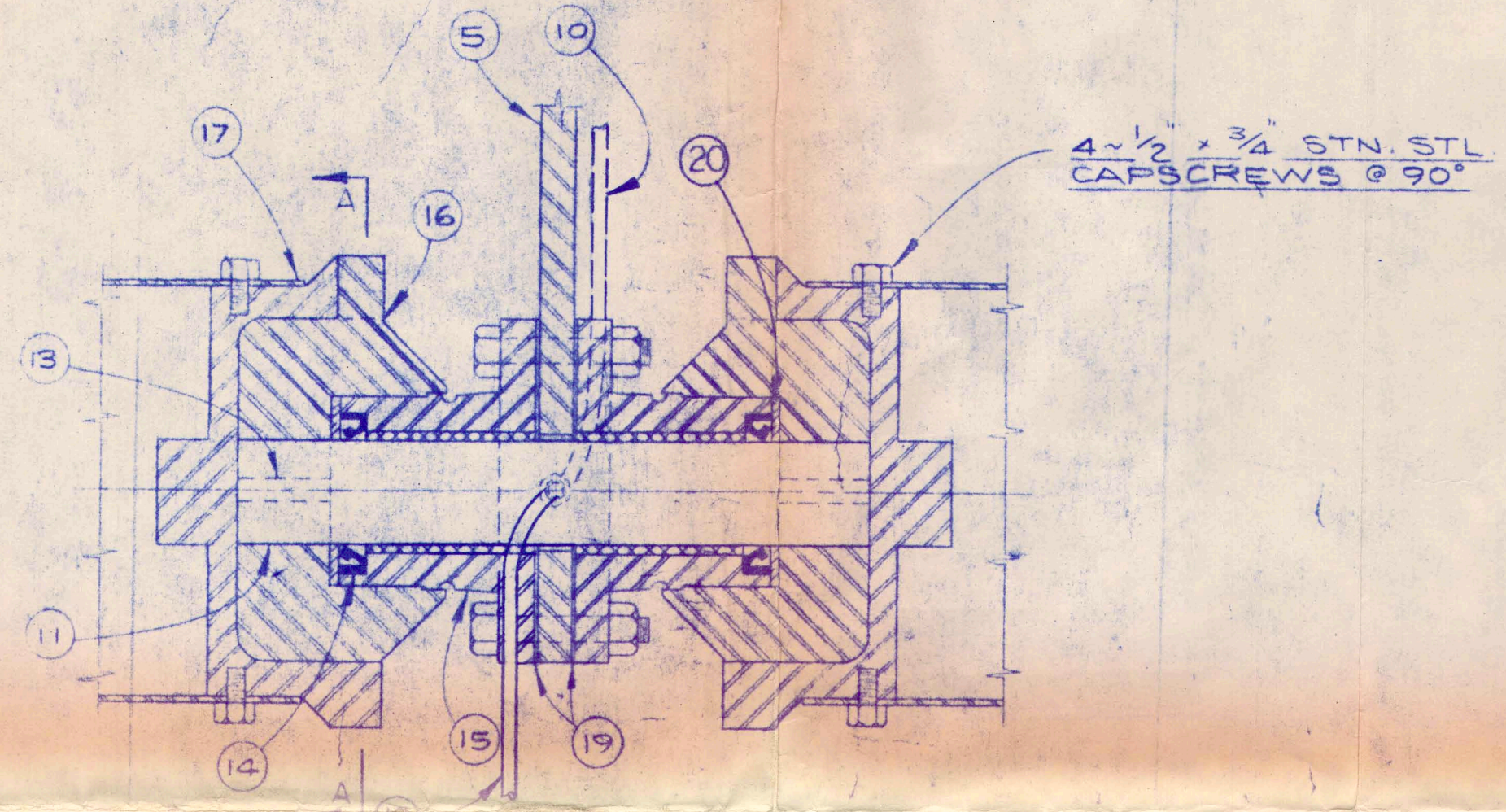
SECTION A-A
(TYPICAL FOR ALL DRIVE COUPLINGS)

ASSEMBLY LIST

- 1 TAIL END ANCHOR PLATE
- 2 SPACER
- 3 TAIL END BEARING SUPPORT
- 4 ANCHOR BOLT
- 5 INTERMEDIATE BEARING SUPPORT
- 6 MITER BOX SUPPORT
- 7 MITER BOX
- 8 TORQUE TUBE - 1 5/8" O.D.
- 9 FLEX, DISC. COUPLING
- 10 GREASE LINE
- 11 INTERMEDIATE DRIVE SHAFT
- 12 TAIL SHAFT
- 13 KEY
- 14 GREASE SEAL
- 15 BEARING
- 16 DRIVE COUPLING
- 17 TORQUE TUBE - 3"
- 18 INTERRUPTED FLIGHT BUOYANT HELICOID SCREW - 18" DIA. x 18" PITCH
- 19 GASKET, 1/32" CORDET
- 20 THRUST WASHER

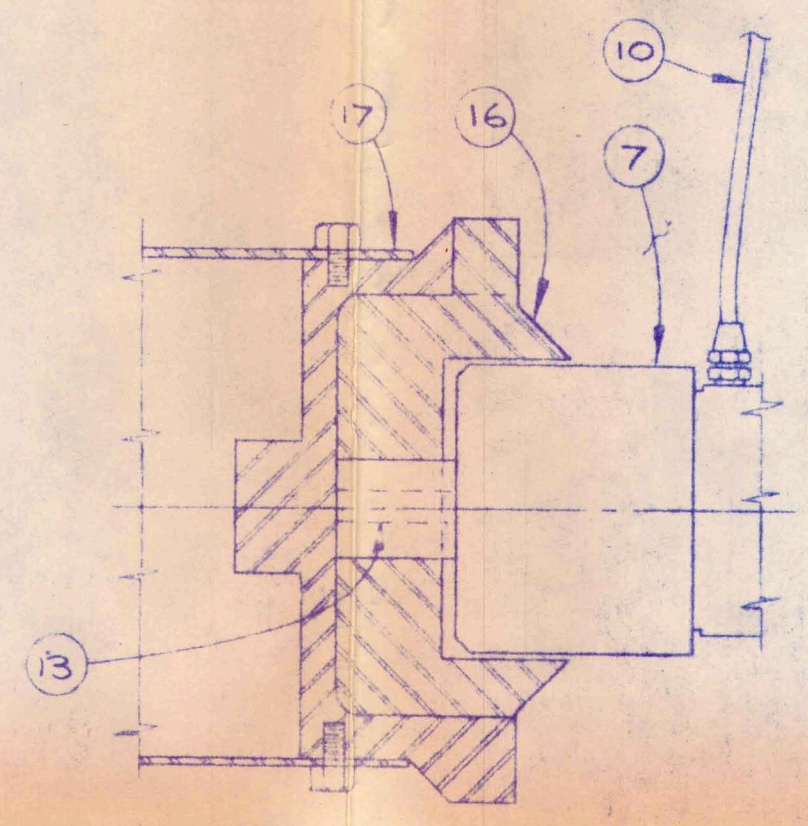


DETAIL #1
SCALE 4" = 1'-0"

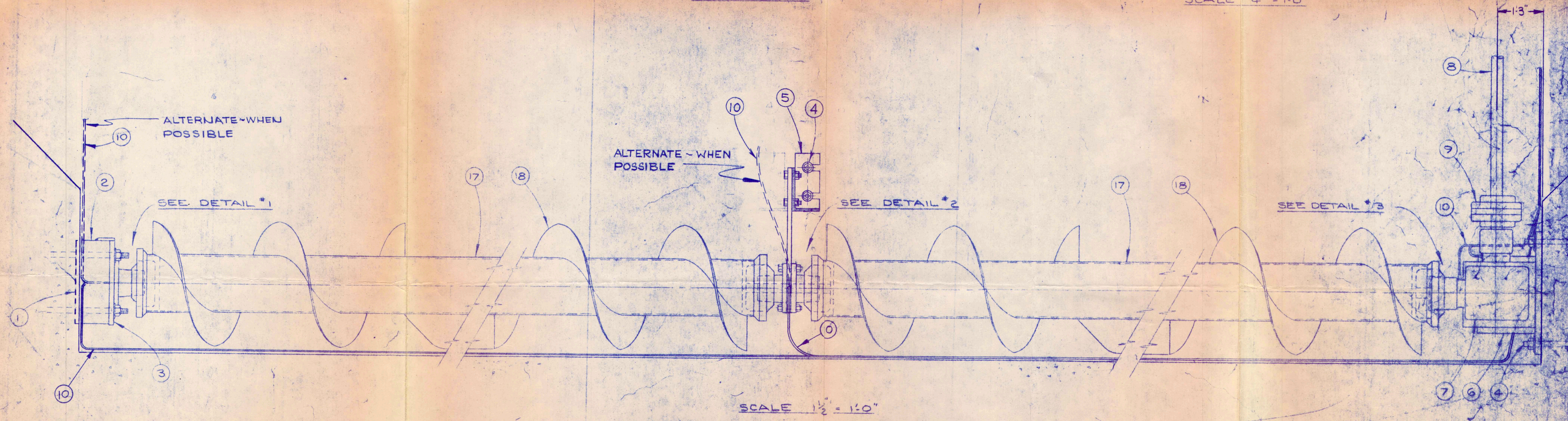


DETAIL #2
SCALE 4" = 1'-0"

4 1/2" x 3/4" STN. STL. CAPSCREWS @ 90°



DETAIL #3
SCALE 4" = 1'-0"



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

SUBSTITUTION OF CINCH ANCHORS, EXPANSION SHIELDS, STUDS SET WITH A "STUD DRIVER" OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE POURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

REVISIONS		DATE	BY	WALKER PROCESS EQUIPMENT DIVISION OF CHICAGO BRIDGE & IRON CO. AURORA, ILL., U.S.A. HELITHICKENER ASSEMBLY
THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT. REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.			DATE 10-7-71 BY CR CHECKED 10-13-71 APPR. [Signature] APPR.	SCALE 1 1/2" = 1'-0" CONTRACT
99A 3100 2A				FILE 4533497-0

WINNEPEG, MANITOBA
SEWAGE TREATMENT PLANT

APPROVED
VARIATION FROM PLANS AND
SPECIFICATIONS NOT APPROVED
AUG 31 1966 *DKR*
W. L. WARDROP & ASSOCIATES LTD.
ENGINEERING CONSULTANTS
WINNEPEG, CANADA

WALKER PROCESS EQUIPMENT
factory • engineering offices • laboratory
Aurora, Illinois

CONTRACTOR

NOTE

All instructions are written and published as an aid to the user, helping him complete his work without damage to the equipment or unnecessary delay due to lack of knowledge. A few minutes spent reading these instructions will be hours saved in re-doing some part of the assembly of this equipment. The instructions contained herein are a compilation of many years' and many contractors' experience.

All anchorage should now have been set per drawings supplied for this purpose.

Clean the threads of all anchorage bolts and oil them.

Locate all the parts that pertain to this equipment. Use the detailed packing list furnished by Walker Process Equipment.

Move all the parts to within hook travel of the work area.

One man should be given the packing list of nuts, bolts, washers, pins, etc., and be held responsible for their storage and distribution as needed. A few moments' study will show which crate or carton contains the pertinent parts. This will save scattering and possible loss of important parts and fasteners.

One copy of these instructions is for the use of the plant personnel. Please see that it is delivered to them in good shape.

CONTRACTOR – Please Note!

Special Instructions On Painting And Backcharges

BACKCHARGES

Walker Process Equipment will not accept any charge for modification, servicing, adjustment or for any other item without written authority in the form of a purchase order issued from the home office at Aurora, Illinois in advance of doing the work. This authority will only be given when satisfactory proof is submitted and the authority will only then be issued providing the price is agreed upon and the authority is given as outlined above.

ANY BACKCHARGE SUBMITTED CONTRARY TO THIS AGREEMENT WILL BE REJECTED IN TOTAL WITHOUT CONSIDERATION.

PAINTING

The material which we have supplied for this job has had surface preparation and painting in accordance with the Engineer's detailed plans and specifications prepared for the job. EQUIPMENT PAINTED WITH PRIME COATS ONLY SHOULD GET ADDITIONAL COATS WITHIN A MONTH AFTER RECEIPT, TO PROTECT THE SURFACE UNDER FIELD STORAGE CONDITIONS. Further than this, any bruises, mars and/or scratches caused by loading and unloading the equipment must be immediately touched up in the field prior to any storage.

WALKER PROCESS EQUIPMENT WILL NOT ACCEPT ANY RESPONSIBILITY FOR RUSTING DUE TO MATERIAL WHICH HAS NOT RECEIVED ADDITIONAL COATS IN THE FIELD.

Primer paints do not act as finish coats and are used because of their properties of good adherence to the metal surface, but are not 100% moisture-proof. The finish coat provides this moisture barrier. If additional coats of paint are not applied to the prime surface, the prime paint may begin to come off, rust will begin to form and on those items of equipment where hand-cleaned surfaces only were specified, previously tight mill scale will begin to loosen. Even in the case of sandblasted or pickled material, paint can begin to come off and rust can occur since the prime coat will allow moisture to get through to the metal surface. Once rust starts to form underneath the paint, the additional rusting will be very rapid.

2 1

CONTRACTOR - PLEASE NOTE SPECIAL RECEIVING AND ANCHORAGE INSTRUCTIONS

RECEIVING MATERIAL:

All material has been thoroughly checked and inspected before shipment from Aurora. If the equipment is received in bad condition or if the packages are broken, make a bad order notation on the shipping papers to this effect.

This will enable you to place the proper claims against the freight company. Please notify us immediately if any parts are found broken or damaged during shipment. Please store very carefully as Walker Process Equipment cannot be responsible for material deterioration due to exposure and improper storage. We would be pleased to answer any questions which you may have regarding the handling and erection of this equipment. Kindly address all inquiries to Walker Process Equipment, P.O. Box 266, Aurora, Ill. 60507

We suggest that these instructions be read carefully since a few minutes reading may save considerable time and expense at a later date.

FOUNDATION BOLTS:

Foundation bolts are shipped direct to the job upon receipt of the approved prints in our Aurora office. Kindly notify us if foundation bolts are not received in order that you will not be delayed in construction.

The foundation bolts must be placed accurately to avoid future erection difficulties. Walker Process Equipment furnishes a template for positioning the foundation bolts where indicated. If a template has not been furnished, extreme care should be exercised as to location and projection. Amount of projection is indicated on the anchorage drawing.



WINNIPEG, MANITOBA
SEWAGE TREATMENT PLANT
TABLE OF CONTENTS

Painting Specifications

Specifications - Cog Bridge Type "CB"	71-W352W
Foundation Layout	4S33416-0
Foundation Layout	4S33417-0
Rail & Rack Splice Details.	3S33233-1
Typical Assembly - Cog Bridge Type "CB"	4S33486-1
Typical Assembly - Cog Bridge Type "CB"	4S33487-1
Typical Assembly - Cog Bridge Type "CB"	4S33488-1
Typical Assembly - Cog Bridge Type "CB"	4S33489-1
Typical Assembly - Cog Bridge Type "CB"	4S33490-1
Typical Assembly - Cog Bridge Type "CB"	4S33491-1
Typical Assembly - Cog Bridge Type "CB"	4S33492-1
Cog Bridge Electric Controls	1S33592-0
Specifications - Buoyant Helithickener.	71-W353W
Helithickener Drive Assembly..	3S33496
Helithickener Assembly.	4S33497

WINNIPEG, MANITOBA
SOUTH END WATER POLLUTION CONTROL CENTER
TABLE OF CONTENTS

Painting Specifications

Circular Collector Specifications	71-W354W
Foundation Layout Circular Collector - SWP.	4S33494-0
Foundation Layout Circular Collector - SWP.	4S33495-0
Erection Elevations (MK).	1S30975-0
Assembly Circular Collector - SWP	4S33509-0
Bridge Slide Plate Assembly (MK).	1S16261-0
Bridge Slide Plate Assembly (MK).	1S16261-0
End Handrail Post Assembly.	1S28433-0
Center Handrail Post Assembly	1S28434-0
Scum Port Assembly.	1S27639-0
Slip Tube Assembly (MK)	1S32528-0
Diffuser Gate Assembly (MK)	1S31011-1
Erection Instructions Pier & Tank Seals	1S31300-0
Bottom Seal Assembly - SightWell.	3S31980-0
Bottom Seal Assembly - ClariFlow Well (MK).	3S31981-0
Bridge, Drive & Center Pier Assembly.	1S30948-0
Flight Assembly	1S30954-0
Skimmer C'Weight Assembly	1S31109-0
Drive Cage & Truss Arm Assembly (Top Conn.)	1S30960-0
Drive Cage & Truss Arm Assembly (Bottom Conn)	1S30961-0
Skimmer Assembly.	3S30269-0
Scum Box & Lip Assembly (MK).	3S31099-0
Weir Plate Assembly (MK).	1S10166-0
Scum Baffle Assembly (MK)	1S10033-0

WINNIPEG, MANITOBA
SOUTH END WATER POLLUTION CONTROL CENTER
TABLE OF CONTENTS

Painting Specifications

Circular Collector Specifications	71-W354W	✓
Foundation Layout Circular Collector - SWP.	4S33494-1	✓ ✓
Foundation Layout Circular Collector - SWP.	4S33495-1	✓ ✓
4 Erection Elevations (MK).	1S30975-0	✓ ✓
Assembly Circular Collector - SWP	4S33509-1	✓ ✓
Bridge Slide Plate Assembly (MK).	1S16261-0A	✓ ✓
Bridge Support Assembly	1S34022-0	✓ ✓
End Handrail Post Assembly.	1S28433-0	✓ ✓
Center Handrail Post Assembly	1S28434-0	✓ ✓
Scum Port Assembly.	1S27639-0	✓ ✓
Slip Tube Assembly (MK)	1S32528-0	✓ ✓
4 Diffuser Gate Assembly (MK)	1S31011-1	✓ ✓
4 Erection Instructions Pier & Tank Seals	1S31300-0	✓ ✓
4 Bottom Seal Assembly - SightWell.	3S31980-0	✓ ✓
Bottom Seal Assembly - ClariFlow Well (MK).	3S31981-0	✓ ✓
4 Influent Well Assembly Detail	1S18496-1	✓ ✓
4 Bridge, Drive & Center Pier Assembly.	1S30948-0	✓ ✓
Influent Well Hanger Assembly	1S30950-0	✓ ✓
Flight Assembly	1S30954-0	✓ ✓
Influent Well and Hanger Assembly	1S31114-0	✓ ✓
Skimmer C'Weight Assembly	1S31109-0	✓ ✓
Drive Cage & Truss Arm Assembly (Top Conn.)	1S30960-0	✓ ✓
Drive Cage & Truss Arm Assembly (Bottom Conn)	1S30961-0	✓ ✓
Skimmer Assembly.	3S30269-0A	✓ ✓
Scum Box & Lip Assembly (MK).	3S31099-0A	✓ ✓
Weir Plate Assembly (MK).	1S10166-0A	✓ ✓
Scum Baffle Assembly	1S34693-0	✓ ✓
4 Scum Baffle Standard	1S10033-0A	✓ ✓

Spur Gear Drive Assembly. 4S32227-1
Overload Alarm Wiring Diagram 1S33061-0
Bellville Spring Overload Assembly. 1S32841-0
Installation Instructions Bellville
Overload Indicator. 2S33007-0

HAND RAIL REVISION 99A520015A

REEL SHAFT BRACKET REVISED 99A520014A

ALLEN BRADLEY CANADA LTD ED-1000-184-71-C

" " " " DD-1000-184-71-C

WINNIPEG, MANITOBA
SOUTH END WATER POLLUTION CONTROL CENTRE
SHOP PAINTING SPECIFICATIONS

Sightwell Collectors, Cog Bridges, Helithickeners

All ferrous parts sandblast and one shop coat of Pratt & Lambert Palgard Epoxy Primer.

Drive - Prime and finish coat of grey machinery enamel.

Handrails and deck plate - hot-dip galvanized.

NOTE: ALL FIELD TOUCH-UP OF MARS, SCRATCHES, BRUISES, ETC., RECEIVED BY EQUIPMENT DURING SHIPMENT, STORAGE OR ERECTION, AND ALL FIELD PRIME COATS ON FIELD WELD SEAMS TO BE NOT BY WPE.

ALL FINISH PAINT COATS TO BE NOT BY WPE. IT IS RECOMMENDED THAT FINISH PAINT COATS BE OF SAME TYPE AND BY SAME PAINT MANUFACTURER AS PRIME COAT TO INSURE OPTIMUM COMPATIBILITY.

CONTRACTOR TO VERIFY COMPATIBILITY OF PRIMER WITH SELECTED FINISH COATS OR ADVISE SELECTION OF FINISH PAINT COATS.

NO SHOP PAINTING ON ALUMINUM, STAINLESS STEEL OR OTHER NON-FERROUS METAL OR ON GALVANIZED METAL UNLESS SPECIFICALLY DESIGNATED. NO FIELD OR SHOP PAINTING ON SPARJERS OR ON GAS DIFFUSION HEAD.

WINNIPEG, MANITOBA
SOUTH END WATER POLLUTION CONTROL CENTRE
TRACTOR BRIDGE COLLECTOR
SPECIFICATIONS
SECTION 13

Application ----- Sludge Collector
Tank Size ----- 2 @ 170' x 30' x 14'-0" W.D.
Number of Units ----- Two (2)
Loading ----- 30 lbs./ft. scraping load plus dead load.

Each unit will conform to the following specifications:

Bridge - Truss Construction

The bridge shall be of beam construction, with structural steel beams and 3/16" galv. steel checker plate. Access to the bridge walkway shall be by means of steel steps, at each end of bridge.

Drive Assembly -----

The main drive unit of each mechanism shall consist of a motor, Poly-flex coupling, gear reducer, drive sprockets, and chain guard.

The motor shall have preselected speeds, of 1800 and 900 RPM to provide bridge speeds of 8.0 fpm "working" and 16 fpm "deadheading". Motor shall be Louis-Allis or equal, Class "B" insulation, and shall have a sealed conduit box. The motor shall be of TEFC construction, one HP, 1800 RPM. The main power shall be three phase, 60 cycle, 575 volt.

The gear reducer shall be a double reduction worm gear, Winsmith size 5 DBI, ratio: 75:1. The unit shall be fully enclosed in oil-tight cast iron housing with gears of anti-friction type and running in oil.

The drive unit shall mount at the center of the bridge and shall drive a 2-7/16" line shaft thru a roller chain drive arrangement. The line shaft will drive two pinion jack shafts thru roller chain drive. The line shaft shall run in multiple grease-lubricated self-aligning ball bearings.

Chain & Sprockets -----

Main drive, hoist and pinion drive are 19-T drive and 45-T driven steel roller chain sprockets with 3/4" pitch. Chain guards are 12 ga. steel. Chain is steel roller, double strand, 3/4"

Rack & Pinion -----

Rack is cut steel, C-1020, 1/2" thick, 3'-9" long sections, teeth on 3" pitch. Each end mounted to angle clips supported from base plate anchored to concrete deck.

Pinion is cut steel, C-1045, 2-1/2" thick, 16.25" P.D. with flame hardened teeth. Pinion keyed to 2-7/16" shaft which rotates in flanged roller bearings.

Hoisting Drums -----

The attitude and height of the sludge scraping and skimmer assemblies shall be controlled by multiple, level-winding steel drums driven by a continuous common line shaft powered near its mid-point by a double reduction worm gear reducer, driving the line shaft thru an enclosed roller chain drive. These drums shall raise or lower Type 304 stainless steel cables which, in turn, control the flights. The hoisting assembly shall be designed to automatically lift the scrapers about three feet off the tank floor and lower the skimmer flight for the return run of the collector assembly, but the hoisting arrangement shall be designed to allow manual setting to permit lifting the entire flight assembly to a point above the tank wall for maintenance. The continuous line shaft shall turn in multiple, grease-lubricated self-aligning ball bearings, and the shaft shall be pinned to each hoisting drum.

The motor is 1½ HP, 1750 RPM, 3/60/575 volt, TENV, Nema "D", Class "B" insulation, Louis-Allis, with built-in brake. Reducer is double reduction worm gear, Winsmith, size 6 DBI, ratio - 375:1.

- Shafting ----- All shafting shall be cold rolled solid steel shafting, straight and true, and of sufficient size to adequately transmit all bending and torsion of starting and operation. All keyways and flanged couplings for all drive shafts shall be sized to transmit the full load of the drive units.
- Top Rails ----- Each sludge collector unit shall run on two-40 lb. rails with cushioned bumpers at each end. ASCE rails supported at 3'-9" CC.
- Steel Truck Wheels ----- One set of 16" car wheels, alloy cast steel, heat-treated, shall be double-flanged and the opposite set shall be flat, so as to be auto-compensating for bridge temperature length variation. Each wheel shall mount on a steel shaft turning in sealed, grease-lubricated roller bearings, mounted on the bridge end trucks.
- Scraper Supports ----- Each scraper blade assembly shall be positioned and guided in hoisting by steel 4" O.D. x 1/4" wall pipes attached to the assembly by stainless steel pin joints.
- Scraper Flights ----- The scraper flights shall be 18" deep x 1/4" thick steel and shall be fitted with Neoprene squeegee, 1/2" x 6", and polyurethane wearing shoes.
- Skimmer Flights ----- Flights are 9" x 1/4" steel with 3/8" x3" Neoprene squeegees, and supported by 3" steel pipe.
- Beach Plate ----- 30" x 1/4" steel.
- Control Panel & Programming -1-Control Panel with control functions and overload alarm - per contract specs. See Allen-Bradley drawings

Remote alarm and running light - NOT BY WPE

All wiring and conduit external of control panel; that is from reel to control panel and from panel to motors, limit switches, etc., - NOT BY WPE.

Power and Control System ---	Electric power shall be supplied by a flexible insulated six-conductor cable, especially designed for payout and retractable service. Cable shall wind on a special aluminum double-winding reel with collector rings, that is counter-balanced with constant tension through 1/8" stn. steel cable and counter-weight. The cable terminates at one end of tank with a bracket and kellam grip. Junction Box - NOT BY WPE.
Floor Rails -----	Four sets of steel channels, 4" x 7.25#.
Anchorage -----	Galv. bolts and nuts.
Painting -----	See separate painting specifications.

BRIDGE AND HANDLING

Bridge will arrive at job site in three (3) sections. Care must be exercised when handling so as not to twist bridge, remove camber or stress bridge in any manner other than what it is specifically designed for! Do not attempt to attach lifting devices to any chord!

Place beams under bridge (When and where required per attached sketch.) Fasten lower chords of bridge to beams with chain or cables. Do not drill or bolt. Attach lifting cables to beams or trucks, making sure cables feed through bridge members without any interference which would put a "force" on the bridge when moving.

NOTE: Before moving, check bridge and trucks for correct orientation trucks are marked "East" and "West" see drawing in brochure. Working travel of bridge is in a "North" direction. When lifting and moving into position, do not jerk, but lift and move as level as possible!

After aligning and blocking end trucks, erect adjustable shoring aligned with and leveled at a height to provide one and one-fourth inch (1 1/4") required camber in relation to top of trucks. Place center section and secure to shoring, slip end sections over bayonet splice connector and bolt to trucks. After checking camber and alignment, adjusting to maintain camber if required, weld chord members per drawing 3S30180, and complete connection of secondary members. Place and weld loose floor plates. Remove shoring gradually.

DRIVE SHAFTS

Loosen bearing bolts and adjust (Shim if necessary) bearings, connect couplings. Shafts must be free to rotate easily. Install Roller Chains, align sprockets.

BRIDGE

Bridge can now be moved to a point over tank which will allow raising and lowering of flights without interference with tank channel.

NOTE: When moving, push on or (pull from) both trucks the same. Do not use bridge proper.

SLUDGE FLIGHTS

Refer to drawing 4S-30176-0 in brochure for details. Assemble flight sections plumb arm hanger and adjust wearing shoes, floor wiper, back up plates and end wipers.

HOIST (Ref. Drwg. 4S30177-0)

Attach cable to each flight arm, then attach other end to Hoist Drum, making at least one wrap on Drum. Pull cable taut with flight on floor. Final adjustment must be made after electrical power is connected.

CABLE REEL: (Drawing 4S-30178-1)

Attach plug end of power cable to bracket at North end of tank, per drawing 3-S-30211-0 and attach other end to collector ring, after winding all excess cable on wide face of reel.

Install counter-weight and attach $\frac{1}{8}$ " steel cable to weight, thread cable around guide sheave and attach other end to narrow face; excess to be wound on reel.

Adjust reel as necessary to allow laying of electric cable and steel cable in its respective guide.

ELECTRICAL: (Ref drawing 1S-30212-0) & 4S30994-0

Wire from collector ring to panel and to all motors and limit switches. After wiring has been completed and checked out, adjust limit switches controlling hoist as shown on drawing 4S-30182-1.

Final adjustment of hoist cable should now be made.

Move bridge to each end of tank (Flights up) using hand control to facilitate setting of tripper for travel limit switches and rail stops.

Refer to (Drawing 4-S-30177-0). Be sure that flights are in required position when limit switch actuates.

Check operation of bridge and hoist on automatic controls.
(See separate instructions).

LUBRICATION

Grease all bearings once each week. Brush oil on roller chain once each week. Lubricate gears in accordance with instructions refer to lubrication instructions in brochure manufacturers bulletin.

WINNIPEG, MANITOBA
SOUTH END WATER POLLUTION CONTROL CENTRE
SPECIFICATIONS
HELITHICKENER
SECTION 14

- Application ----- Sludge Thickening & Removal.
- Hopper Size ----- 30'-0" long x 5'-0" deep x 1'-9" Wide.
- Number of Units ----- Two (2).
- Helicoid Size ----- 18" dia. x 18" pitch, approximately
30'-0" long over-all.
- Type of Drive ----- Single
- Each unit shall conform to the following specifications:
- Rotational Speed ----- Approximately 15 rpm
- Drive ----- 1 - Motor, 1 HP, 1750 rpm, 3 phase, 60 cycle,
575 volt, A.C. Totally enclosed.
Make: Louis Allis or equal.
1 - Reducer, Type: Worm gear, ratio 32:1,
Size 303.
1 - Drive sheave, equipped with dry fluid
coupling, Make: Dodge Flexidyne,
Size 6D.
1 - Driven sheave
1 - Drive cover, 12 gauge
1 - Shear pin coupling assembly for drive and
mechanism protection.
1 - Drive support, with base plate
1 - Shear pin overload system.
- Coupling ----- 1 - Flexible coupling connecting reducer
output shaft and drive shaft.
Make: Dodge Size No. 7.
- Drive Shaft ----- Steel tubing, machined to fit flexible
coupling on both ends. Dimensions:
1-5/8" x 5/16" wall.
- Coupling ----- 1 - Flexible coupling connecting drive
shaft to miter gear box.
Make: Dodge Size: No. 7.
- Gear Drive ----- 1 - Miter gear box assembly with hardened
alloy steel cut gears in Timkin
tapered roller bearings. Shafts of
125,000 lbs. tensile alloy steel.
Equipped with special greased
labyrinth seals, fed from grease lines.
Ratio 2:1. Heavy precision machined
cast iron gear box.

- Helicoid ----- 3/16" sectional steel flights welded to 8" steel torque tube. Tube to be filled with Polyurethane foam. Bearing shafts are stainless steel.

- Bearings ----- Special babbitted sleeve with low PV design, both double lip and greased labyrinth seals, fed by grease lines. Grease lines and fittings - NOT BY WPE.

- Anchorage ----- 1 - Lot galvanized anchor bolts.

- Painting ----- See separate shop painting specs.

- Electric Controls ----- NOT BY WPE.

- Overload Control ----- 1 - Limit switch, NEMA IV
1 - Alarm Bell, Edwards adaptabel weatherproof, Size 6", for 115 volts. Installation - NOT BY WPE.

ERECTION INSTRUCTIONS
HELITHICKENER WITH
MITER GEAR TRANSMISSION

At the time these erection instructions are received, all concrete has no doubt been poured and anchorage set per detailed instructions furnished especially for this particular plant.

Always clean and oil foundation bolts before starting erection of equipment.

IDENTIFYING "HAND" OF SCREW:

If there is more than one Helithickener on your particular installation, you may be confronted with the problem of identifying the "hand" of the screw. In case the factory marking becomes illegible, the following method can be used.

Facing the screw, extend your arms downward at approximately 30⁰ from your body. If the screw face slopes with your right arm, it is a right-hand screw. If it slopes with your left arm, it is a left-hand screw. From the same position, a right-hand screw turning away from you will move sludge toward the right and vice-versa.

Refer to the erection drawings for the direction of withdrawal so that the proper unit may be installed in the proper tank.

ASSEMBLY:

Mount the miter gear unit on the anchorage bolts provided. Do not attempt to position or level gear box at this time as alignment will be done with Helithickener cross collector in place.

If there is more than one screw section per tank, mount sections one at a time.

Beginning with section at gear box end, bolt intermediate shaft to far end of section with the (4) four 3/4" x 2-1/4" bolts and nuts provided. Be sure rabbets are engaged properly.

Now mount the intermediate bearing bracket to the wall and block up Helithickener section in approximate position about 1" off floor.

With lower half of bearing only mounted in the bearing support, slip bearing support around intermediate shaft, and bolt support to bracket. Now bolt Helithickener flange on other end of the output flange of the gear box. When this has been done, put the top half of the bearing in place and bolt solidly. With this first section in place, all successive sections may be added on in like manner.

Level the Helithickener with a spirit level, adjusting the brackets, supports and gear box to maintain 1" clearance on the bottom and centering between the non-fouling side bars.

If the gear box is too low to properly connect to the Helithickener, steel blocks should be inserted above the wall studs in the slotted bolting holes of the gear box base plate. These blocks will keep the gear box from dropping when the nuts are run down.

DRIVE:

The drive unit is shipped completely assembled. With the leveling nuts on the anchorage bolts, mount the drive unit on the leveling nuts. Check alignment of the reducer output shaft to the miter gear box flange with a plumb bob.

Even though the torque tube is coupled to the reducer through a universal joint, the alignment of the reducer and gear box is still essential and must be maintained.

Engage the splined end of the torque tube into the universal joint and swing the lower flange into proper position and lower onto the gear box input shaft. Again, be sure rabbets are properly engaged. It may be necessary to wait until drive is wired for power,

so that torque tube can be turned for proper alignment of bolt holes in flanges.

Adjust leveling nuts under drive until drive base plate is at the proper elevation as shown on the assembly drawings.

Miter gear box has been lubricated at the factory and requires no further lubrication. With the exception of the special greased labyrinth seals, a grease line to each seal, and one line to each bearing (intermediate, and stub) to be greased twice weekly with Lubriplate Multi Lube "A".

Be sure the drives, seals, and bearings have been lubricated before attempting to run them. Refer to lubrication instructions 9-S-7825 in your brochure.

When unit has been completely assembled and all lubrication has been completed, run the unit in dry tank for operational check.

Walker Process "Cogbridge" Collector Control Panel

Electrical Operating Instructions

(Please refer to Schematic diagram ED-1000-184-71)

All circuitry is shown de-energized with the Bridge in the extreme west effluent position. The Hoist is shown in the raised position. We will consider this to be the home or "Rest" position of the Bridge.

A program or cycle will consist of one complete trip over the full length of the tank, this to be followed by one, two or no abbreviated trips in the vicinity of the Sludge Hopper at the east influent end.

The number of trips may be preselected by setting the selector switch marked "Abbrev. Trips".

The travel time of the short trips is determined by the time setting of timers TR2, Short Trip #1 and TR4, Short Trip #2. During the cycle, the Bridge will rest or dwell at the east influent end. A mid tank dwell is also provided for short trips. We are referring to timers TR1 Hopper Dwell and TR3 Short Trip Dwell.

A program timer TC provides programming at any 5 minute increments in a 24 hour schedule. This timer initiates the cycle. A Hoise raise lower monitor (Timer TR5) is used in case the Hoist upper limits should fail, or lower limit fails.

Auto Off Hand Main. Selector Switch

The functions of this switch are as follows:

"OFF" position - All Bridge and Hoist functions are stopped.

"HAND" Position - All automatic functions are by-passed and the respective pushbuttons for Bridge and Hoist operation are operable.

"AUTO" Position - Pushbuttons for Bridge and Hoist operation are by-passed. The Bridge and Hoist are free to function automatically under the control of the various timers.

APPROVED
PLANS AND
SPECIFICATIONS NOT APPROVED
JUN 10 1972
WALKER PROCESS ASSOCIATED LTD.
CONSULTING ENGINEERS

- 2 -

"MAINT" position - All automatic functions are by-passed and the respective pushbutton s for Bridge and Hoist operation are operable.

The normal "Hoist Up" limit switch is by-passed bringing into play a "Hoist Up Maint" limit. Other functions, described later, are performed to facilitate moving the Bridge, in fast speed, past the end stops, to a position suitable for maintenance.

"Auto Initiate" Button

Providing the main selector switch is in the "Auto" position and the Bridge is at the home position, this button can be used to by-pass the program timer and initiate an automatic cycle.

"Cancel Cycle" Button

This button may be used to cancel any remaining portion of an automatic cycle and return the Bridge to its home position at the west effluent end.

"Alarm Silence" Button

If load controller actuates the alarm horn on the Bridge it can be silenced by depressing this button.

"Hoist Reset" Button

If timer TR5 should be allowed to time out indicating that the Hoist Upper limit has failed the reset button is used to reset timer TR5, and same applies if lower limit fails.

"Bridge Reset" Button

The ammeter and load controller will stop Bridge at the second set point and will latch in at this point. The Bridge can only be reset with this button after a shutdown overload condition has occurred.

Operator's Set Up for Automatic Operation

- (1) Turn "Auto-Off-Hand-Maint" selector to the "OFF" position.
- (2) Turn all circuit breakers on.
- (3) Select number of trips.
- (4) Adjust Short Trip #1 Time TR2
- (5) Adjust Short Trip #2 Time TR4
- (6) Adjust Short Trip Dwell Time TR3
- (7) Adjust Hopper Dwell Time TR1
- (8) Select Program TC
- (9) Turn "Auto-Off-Hand-Maint" selector to the "AUTO" position.

Operator's Set Up for Hand Operation

- (1) Turn the "Auto-Off-Hand-Maint." selector to the "HAND" position.
- (2) Turn all circuit breakers on.
- (3) Raise or Lower the Hoist by operating the "Hoist Up" or "Hoist Down" pushbuttons.
- (4) Move the Bridge East or West by operating the Bridge East Slow Button, Bridge West Fast and Bridge Stop Buttons. the Hoist must be up in order to move the Bridge West and down to move the Bridge east.

Operator's Set Up for Maintenance Operation

CAUTION: The Scraper must be lowered and the Bridge moved to a Westerly position such that the Scraper will clear the concrete when raised. The Danger Zone will be marked or painted on the concrete or side rails.

- (1) Observe the above rule.
- (2) Turn the "Auto-Off-Hand-Maint" selector to the "MAINT" position.
- (3) Turn all circuit breakers on.

- (4) Operate the "Hoist Raise" button raising the Scraper to its extreme upper limit. In the "Maint" position, the normal "Hoist Up" Limit is by-passed, and a "Hoist Up Maint" limit is effective. When the Scraper is raised to this position, the west Bridge drive is activated.
- (5) Remove the mechanical and stops from the end of the Tank (West End only).
- (6) Operate the "Bridge West Fast" button and move the Bridge to its "Maintenance" position. Proceed with Caution as there are no end travel limits in operation.

A.J. Jansen
Allen-Bradley Canada Ltd.
May 18, 1972



ENGINEERING INFORMATION

BILL OF MATERIAL FOR ED-1000-184-71

QTY	DEVICE DESIGNATION	CATALOG NO.	SUPPLIER
1	MAIN BREAKER (15AMP)	EF3-BO15V	ITE
2	BRIDGE & HOIST BREAKERS (5AMP)	EF3-A005V	ITE
1	HU-HD	705X-A0D-103	A-B
1	RF-FS	715X-A0D13-103	A-B
2	TRANSF.No.1 & No.2 150VA	1497-N6	A-B
1	TRANSF.No.3 3KVA	X-336670	A-B
1	CR1	700-BXL440-A1	A-B
1	CR2	700-NM400-A1	A-B
1	CR3	700-NM510-A1	A-B
3	CR4, CR5, CR6	700-NM310-A1	A-B
3	CR7, CRF, CRR	700-N220-A1	A-B
1	CRA	700-N200-A1	A-B
1	CRAS	700-N110-A1	A-B
1	TRB (5 SEC)	700-NPT-A1	A-B
1	TD (3 MIN)	849-Z0D32	A-B
1	TR1 (60 MIN)	305D017A10PX	ATC
3	TR2, TR3, TR4 (30 MIN)	305D016A10PX	ATC
1	TR5 (60 SEC)	305D007A10PX	ATC
1	TC	23002-05	PARAGON
2	ELAPSED TIME METERS	RT PATTERN	CROMPTON-PARKINSON
1	AMMETER & LOAD CONTROLLER	MODEL 503K	API
1	HORN	870	EDWARDS
1	RECEPTACLE & COVER	5262 & 5206	HUBBELL
1	THERMOSTAT	2A 37-1	WHITE-RODGERS
1	STRIP HEATER (150W)	S-815	CHROMALOX
3	CCB1, CCB2, CCB3 (15A)	QCL1015	WESTINGHOUSE
1	DRUM SWITCH	806-DS-1280	A-B

APPROVED

VARIATIONS FROM PLANS AND SPECIFICATIONS NOT APPROVED.

JUL 19 1972

W. L. WARDROP & ASSOCIATES LTD.
ENGINEERING CONSULTANTS
WILLOWDALE, CANADA

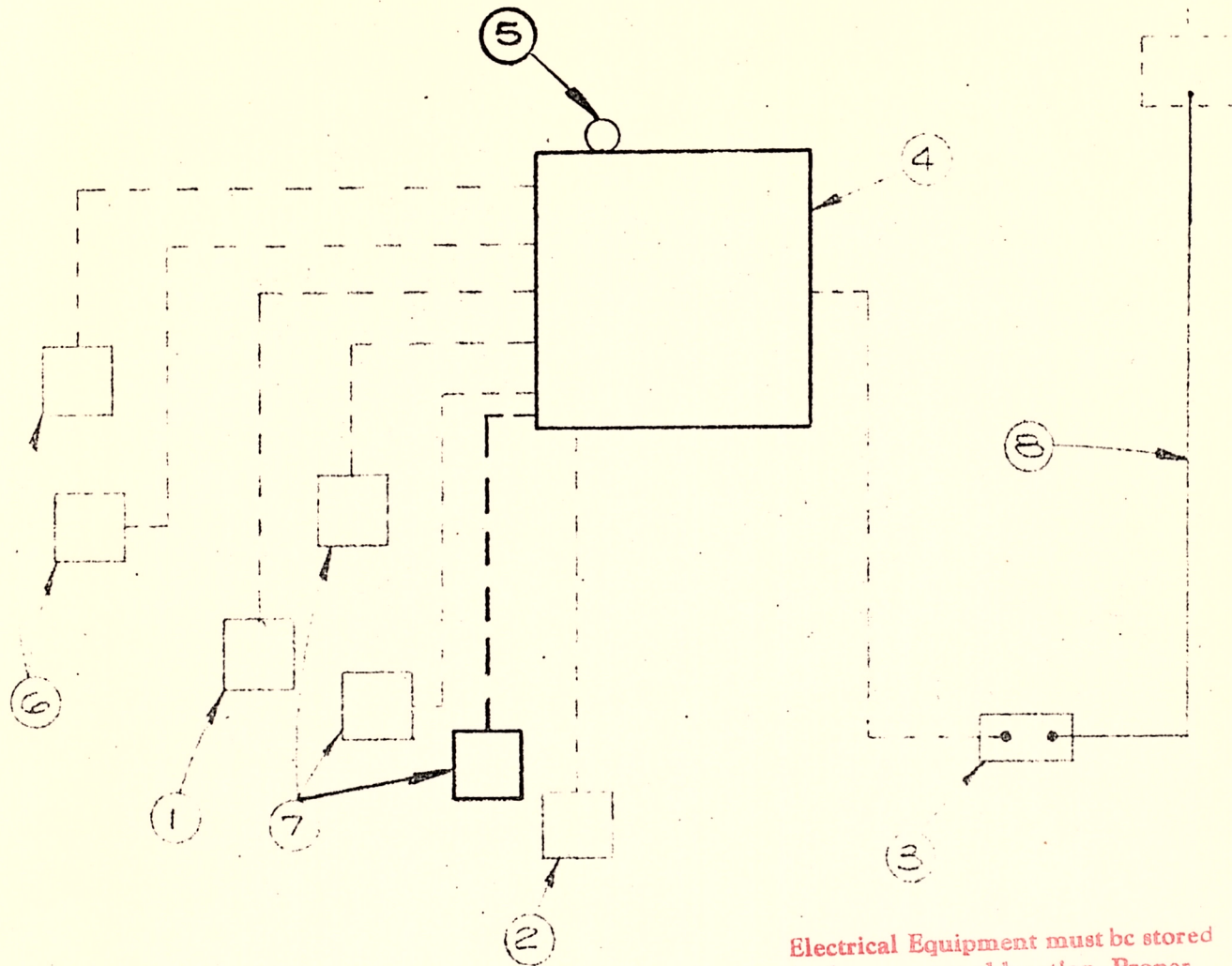
IF CHANGED THIS ISSUE

PREPARED BY DWT
APPROVED BY _____

AUTHORIZATION:

NO. BM-1000-184-71 (SUPP)

JUNCTION BOX & MAIN POWER
(NOT BY W.P.E.)



Electrical Equipment must be stored in dry unexposed location. Proper storage until installation and operation is responsibility of contractor.

NOTE
FIELD WIRING & CONDUIT
(NOT BY W.P.E.)

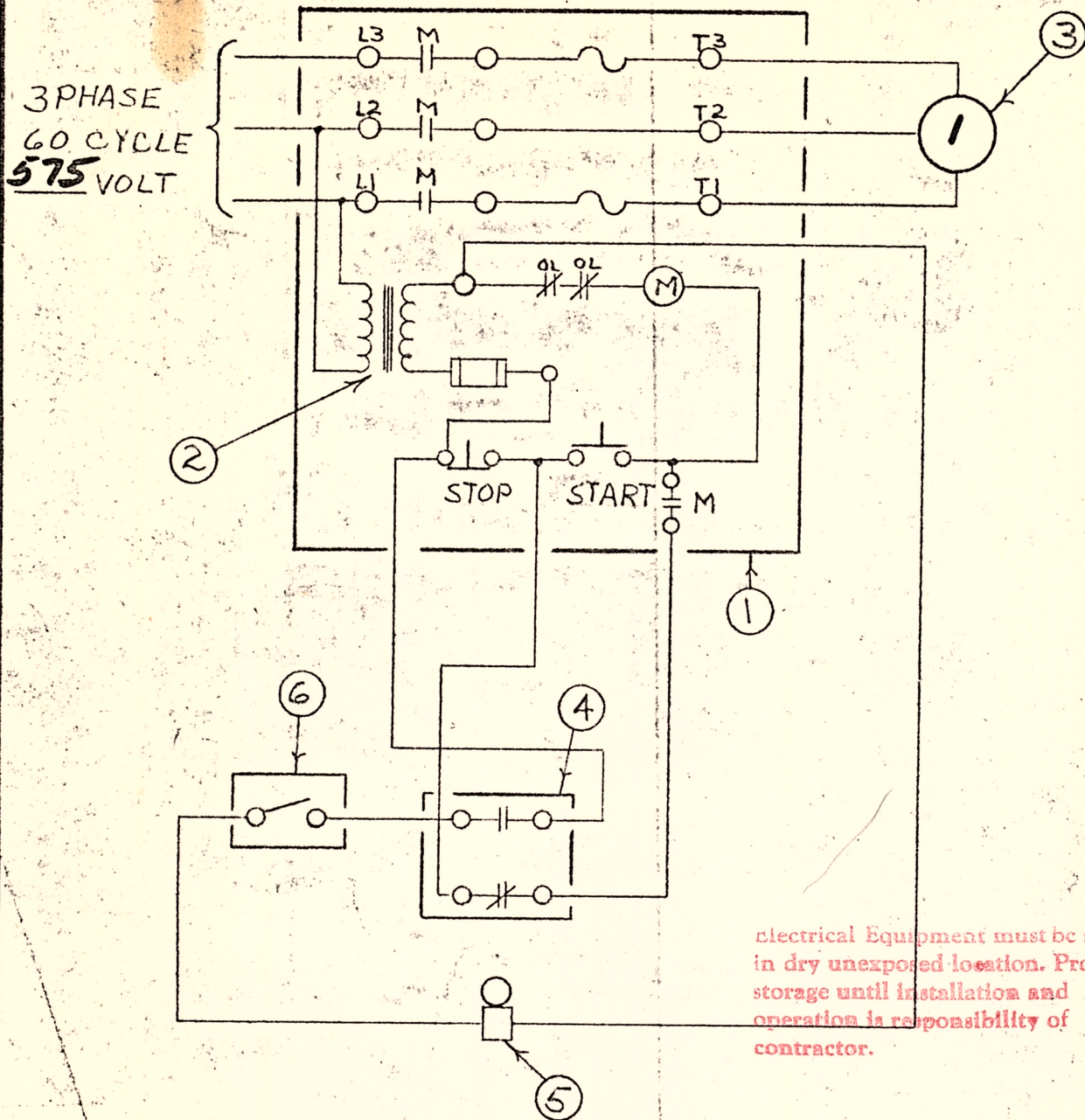
ASSEMBLY LIST

- ① BRIDGE MOTOR
- ② HOIST MOTOR
- ③ COLLECTOR RING
- ④ CONTROL PANEL
- ⑤ ALARM HORN
- ⑥ TRAVEL LIMIT SWITCHES (ON END TRUCK)
- ⑦ HOIST LIMIT SWITCHES (ON BRIDGE)
- ⑧ REEL CORD

Electrical Equipment must be stored in dry unexposed location. Proper storage until installation and operation is responsibility of contractor.

WIRING DIAGRAM - OVERLOAD ALARM

1523413-0




Electrical Equipment must be stored in dry unexposed location. Proper storage until installation and operation is responsibility of contractor.

- ① MOTOR STARTER - NOT BY WPE
- ② CONTROL TRANSFORMER - 150 VA - NOT BY WPE
- ③ MOTOR - BY WPE
- ④ LIMIT SWITCH - BY WPE
- ⑤ ALARM - BY WPE
- ⑥ ALARM ON-OFF SWITCH - BY WPE


APPENDIX B
INSPECTION AND TEST PLAN

INSPECTION TEST PLAN - PRIMARY CLARIFIER TRAVELLING BRIDGE COLLECTOR DRIVE SYSTEM

Project:	CITY OF WINNIPEG BID OPPORTUNITY ###-2018	
	SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES - REFURBISHMENT	
	PCTB No.:	


	TASK	APPLICABLE QC DOCUMENTS/DWGS/STANDARDS	HOLD/WITNESS	SIGNOFF & DATE		
				CONTRACTOR	OEM	CONTRACT ADMIN
1	Contractor accepts City supplied materials. Equipment has been inspected for defects and deficiencies.	<ul style="list-style-type: none"> - CD-PM-TO-13: CERTIFICATE OF EQUIPMENT DELIVERY FORM 100 - CD-PM-TO-14: CERTIFICATE OF READINESS TO INSTALL FORM 101 - List of owner supplied equipment contained in mechanical specifications 	N/A			
2	As-found electrical condition monitoring information including vibration data and motor amperage has been submitted.	TBD	HOLD			
3	<p>All disassembled parts have been inspected, photographed, marked/tagged, packaged, and stored.</p> <p>Contractor accepts disassembled equipment.</p> <p>Mid-repair condition assessment completed, report submitted.</p>	<ul style="list-style-type: none"> - Electronic file structure containing list of stored equipment, photos, and other records to be provided by the contractor - Condition Assessment Report 	N/A			
4	Dimensional check of main drive shaft sections, check for runout on all mating surfaces is completed.	<ul style="list-style-type: none"> - Contractor to supply shop drawing of drive shaft sections meeting the requirements of <ul style="list-style-type: none"> 1) ASME Y.14.5-2009 2)WWD CAD/GIS Standard -OEM Shaft tolerance +0.000" - 0.003" 	N/A			
5	<p>Levelness measurement of pillow block mounting surfaces is completed.</p> <p>Alignment of couplings on 2 sections of main drive line shaft is completed and meets the requirements of the QC Checklist provided.</p>	<ul style="list-style-type: none"> - Measurements and shim sizes on marked up Walker Process DWG 4533487-1 (incl. date/ time/ make/ model/ calibration) - Travelling Bridge Drive and Wheel Alignment QC Checklist provided in Contract Specification Appendix B - Lovejoy F-Series Installation Instructions (Interference) - Angular 0.5° Max per Flex coupling 	N/A			

INSPECTION TEST PLAN - PRIMARY CLARIFIER TRAVELLING BRIDGE COLLECTOR DRIVE SYSTEM

Project:	CITY OF WINNIPEG BID OPPORTUNITY ###-2018	
	SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES - REFURBISHMENT	
	PCTB No.:	

TASK	APPLICABLE QC DOCUMENTS/DWGS/STANDARDS	HOLD/WITNESS	SIGNOFF & DATE		
			CONTRACTOR	OEM	CONTRACT ADMIN
<p>6</p> <p>Alignment of cogwheels to cog track is complete and meets the requirements of the QC Checklist provided.</p> <p>Alignment of the cogwheel axle to main drive shaft is complete meets to the requirements of the QC Checklist provided.</p>	<p>- Travelling Bridge Drive and Wheel Alignment QC Checklist provided in Contract Specification Appendix B</p> <p>- Lovejoy F-Series Installation Instructions (Interference)</p> <p>- DWG 4S33486-3</p> <p>- ISO 12488-1:2012</p>	N/A			
<p>7</p> <p>Alignment of flanged and flat faced running wheel to ASCE 40AS rail alignment is complete and meets the requirements of the QC Checklist provided.</p>	<p>- Travelling Bridge Drive and Wheel Alignment QC Checklist provided in Contract Specification Appendix B</p> <p>- DWG 3S33233-2</p> <p>- ISO 12488-1:2012</p>	N/A			
<p>8</p> <p>All newly installed, aligned, or adjusted parts are marked and tagged.</p> <p>Follow up check on all marked or tagged equipment to confirm they have been installed, aligned, or torqued adequately has been completed.</p>		N/A			
<p>9</p> <p>As-built electrical condition monitoring information including vibration data and motor amperage has been submitted.</p>	TBD				
<p>10</p> <p>Installation of all equipment is complete and satisfactory.</p>	- CD-PM-TO-15: CERTIFICATE OF SATISFACTORY INSTALLATION FORM 102	N/A			

INSPECTION TEST PLAN - PRIMARY CLARIFIER TRAVELLING BRIDGE COLLECTOR DRIVE SYSTEM

Project:	CITY OF WINNIPEG BID OPPORTUNITY ###-2018	
	SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES - REFURBISHMENT	
	PCTB No.:	

TASK	APPLICABLE QC DOCUMENTS/DWGS/STANDARDS	HOLD/WITNESS	SIGNOFF & DATE		
			CONTRACTOR	OEM	CONTRACT ADMIN


I confirm that to the best of my knowledge the information contained in this document is accurate and reflects the current state of the equipment, parts, materials, etc. described herein.

CONTRACT ADMINISTRATOR	KGS GROUP				
Representative:	NAME	TITLE	CONTACT INFO	SIGNATURE	DATE

O.E.M.	OVIVO INC				
Representative:	NAME	TITLE	CONTACT INFO	SIGNATURE	DATE


CONTRACTOR					
Representative:	NAME	TITLE	CONTACT INFO	SIGNATURE	DATE

INSPECTION TEST PLAN - PRIMARY CLARIFIER TRAVELLING BRIDGE COLLECTOR RAILS AND COG TRACK

Project:	CITY OF WINNIPEG BID OPPORTUNITY 682-2018	
	SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES - REFURBISHMENT	


	TASK	APPLICABLE QC DOCUMENTS/DWGS/STANDARDS	HOLD/WITNESS	SIGNOFF & DATE		
				CONTRACTOR	OEM	CONTRACT ADMIN
1	Contractor accepts City supplied materials. Equipment has been inspected for defects and deficiencies.	<ul style="list-style-type: none"> - CD-PM-TO-13: CERTIFICATE OF EQUIPMENT DELIVERY FORM 100 - CD-PM-TO-14: CERTIFICATE OF READINESS TO INSTALL FORM 101 - List of owner supplied equipment contained in mechanical specifications 	N/A			
2	<p>All disassembled parts have been inspected, photographed, marked/tagged, packaged, and stored.</p> <p>Contractor accepts disassembled equipment.</p>	<ul style="list-style-type: none"> - Electronic file structure containing list of stored equipment, photos, and other records to be provided by the contractor 	N/A			
3	Anchor bolt locations have been surveyed, aligned, and marked out on concrete.	<ul style="list-style-type: none"> - Contractor supplied shop drawing of new anchor bolt layout that meets the requirements of: <ul style="list-style-type: none"> a) DWG L-32983 c) ASME Y.14.5-2009 d) WWD CAD/GIS Standard - Contractor to mark up copy of the above shop drawing with the installed anchor bolt location measurements 	HOLD			
4	Alignment and levelness record for the sole plates and for alignment of anchor bolts is completed and meets the requirements of the QC Checklist provided prior to grouting.	<ul style="list-style-type: none"> - Rail and Cog Track Alignment QC Checklist provided in Contract Specification Appendix B - Electronic survey file/laser alignment tool output data - OEM Drawings L-32918 and L-32983 - Standards CMAA 70/74 and ISO 12488-1:2012 	N/A			

INSPECTION TEST PLAN - PRIMARY CLARIFIER TRAVELLING BRIDGE COLLECTOR RAILS AND COG TRACK

Project:	CITY OF WINNIPEG BID OPPORTUNITY 682-2018	
	SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES - REFURBISHMENT	

	TASK	APPLICABLE QC DOCUMENTS/DWGS/STANDARDS	HOLD/WITNESS	SIGNOFF & DATE		
				CONTRACTOR	OEM	CONTRACT ADMIN
5	Alignment of the ASCE 40AS rails is completed and meets the requirements of the QC Checklist.	<ul style="list-style-type: none"> - Rail and Cog Track Alignment QC Checklist provided in Contract Specification Appendix B - Electronic survey file/laser alignment tool output data - OEM Drawings L-32918 and L-32983 - Standards CMAA 70/74 and ISO 12488-1:2012 	N/A			
6	Alignment of the cog tracks is completed and meets the requirements of the QC Checklist.	<ul style="list-style-type: none"> - Rail and Cog Track Alignment QC Checklist provided in Contract Specification Appendix B - Electronic survey file/laser alignment tool output data - OEM Drawings L-32918 and L-32983 - Standards CMAA 70/74 and ISO 12488-1:2012 	N/A			
7	Installation of all equipment is complete and satisfactory.	<ul style="list-style-type: none"> - CD-PM-TO-15: CERTIFICATE OF SATISFACTORY INSTALLATION FORM 102 	N/A			

INSPECTION TEST PLAN - PRIMARY CLARIFIER TRAVELLING BRIDGE COLLECTOR RAILS AND COG TRACK

Project:	CITY OF WINNIPEG BID OPPORTUNITY 682-2018	
	SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES - REFURBISHMENT	

TASK	APPLICABLE QC DOCUMENTS/DWGS/STANDARDS	HOLD/WITNESS	SIGNOFF & DATE		
			CONTRACTOR	OEM	CONTRACT ADMIN

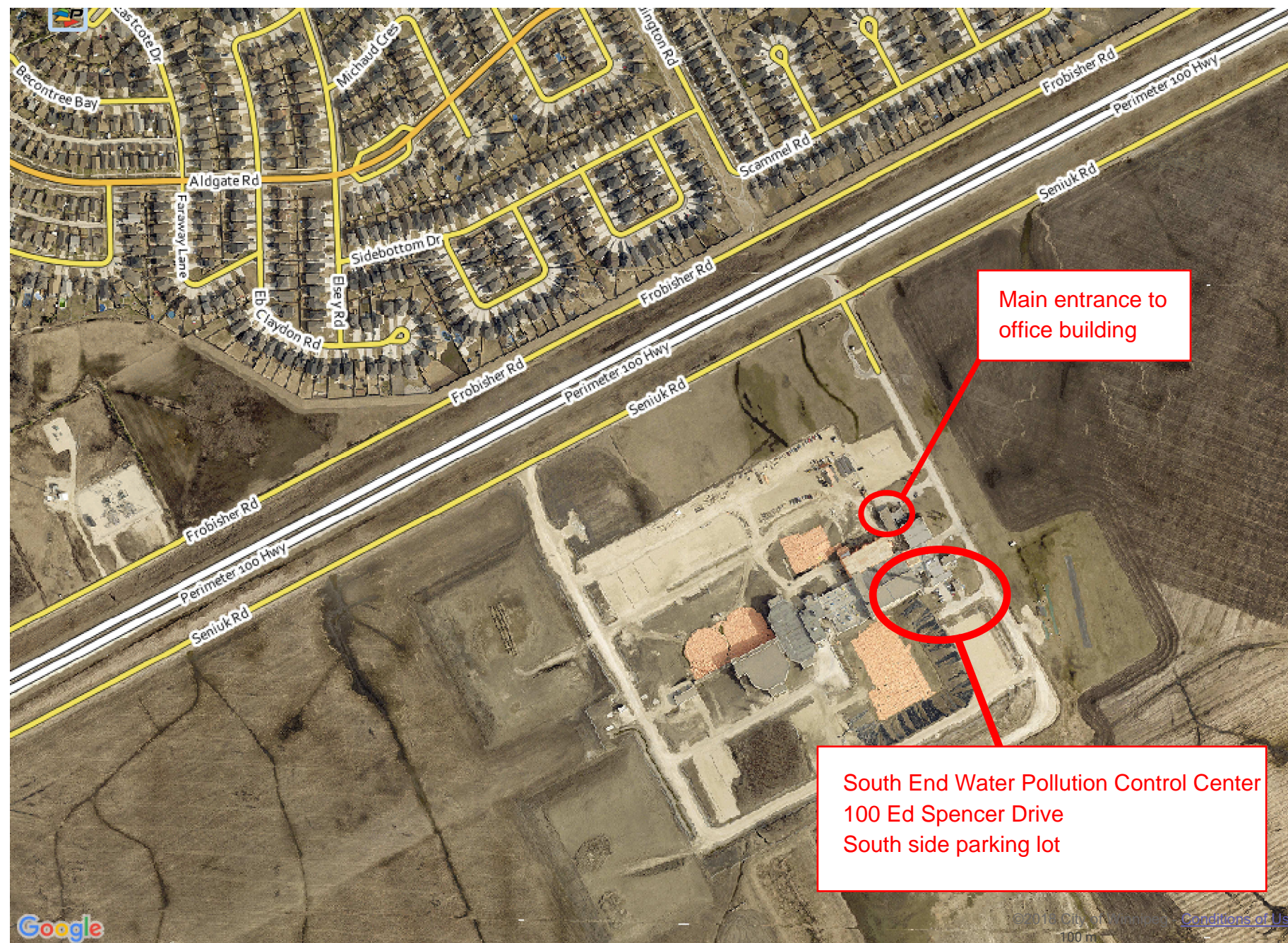
I confirm that to the best of my knowledge the information contained in this document is accurate and reflects the current state of the equipment, parts, materials, etc. described herein.

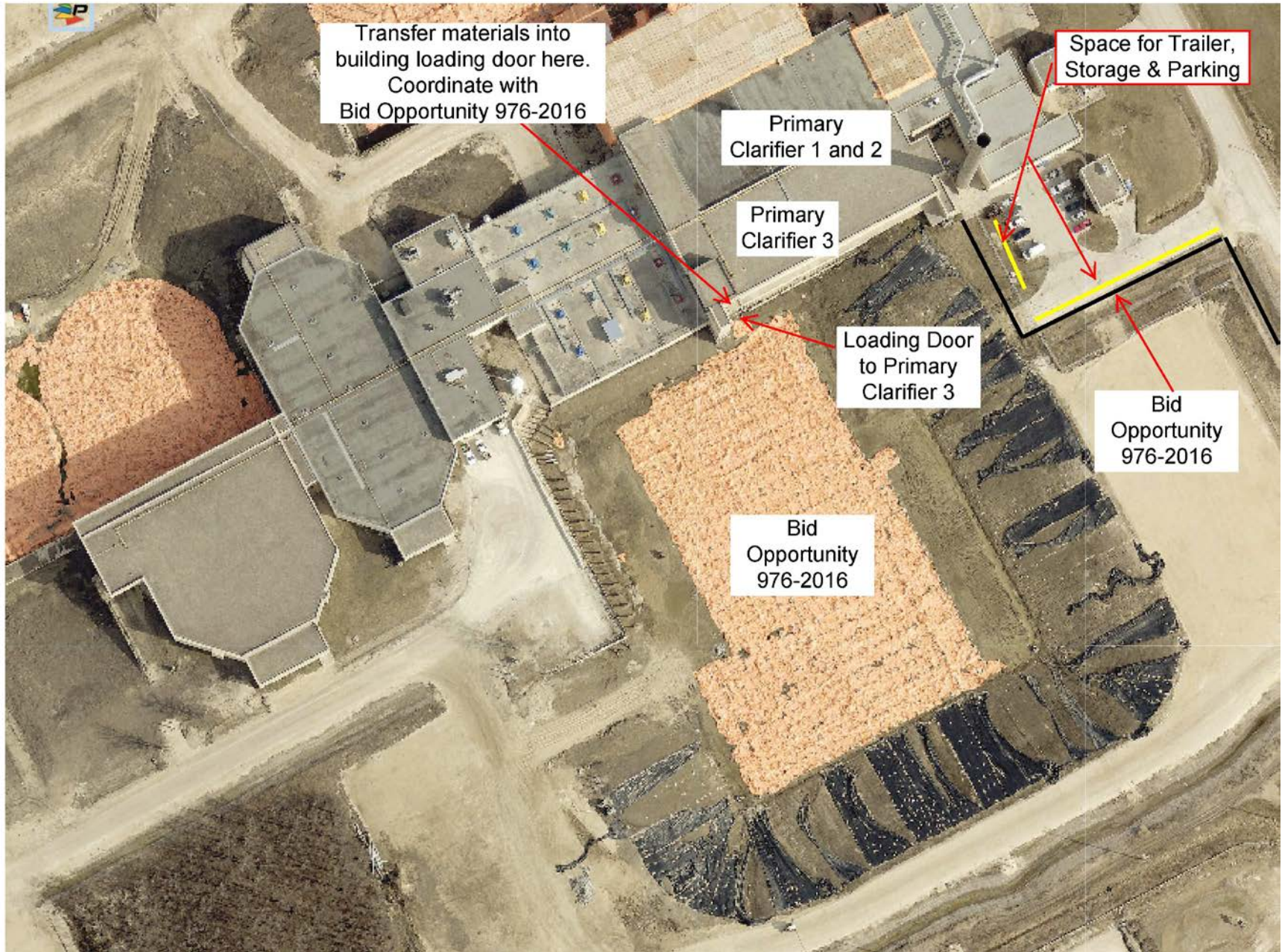
CONTRACT ADMINISTRATOR	KGS GROUP				
Representative:	NAME	TITLE	CONTACT INFO	SIGNATURE	DATE

O.E.M.	OVIVO INC				
Representative:	NAME	TITLE	CONTACT INFO	SIGNATURE	DATE

CONTRACTOR					
Representative:	NAME	TITLE	CONTACT INFO	SIGNATURE	DATE

APPENDIX C
SITE PLAN FOR LAYDOWN AREA





**SEWPCC – PRIMARY CLARIFIER TRAVELLING BRIDGES REFURBISHMENT
SITE PLAN**

APPENDIX D
CONSTRUCTION PLAN
(FORTHCOMING BY ADDENDUM)

APPENDIX E
COMMISSIONING PLAN
(FORTHCOMING BY ADDENDUM)

APPENDIX F
CITY FORMS



Form 100
CERTIFICATE OF EQUIPMENT DELIVERY

We certify that the equipment listed below has been delivered into the care and custody of the Installation Contractor. The equipment has been found to be in satisfactory condition. There is no visible evidence of exterior damage or defects.

Project:

Equipment Description:

Equipment Supply Bid Opp. No.:

Equipment Install Bid Opp. No.:

Equipment Tag No.:

Specification Reference:

(Authorized Representative of Supply Contractor)

Date

(Authorized Representative of Install Contractor)

Date

(Authorized Representative of Contract Administrator)

Date



Form 101
CERTIFICATE OF READINESS TO INSTALL

We have familiarized the installing contractor of the specific requirements related to the equipment listed below and am satisfied that the installing contractor understands the required installation procedures.

Project:

Equipment Description:

Equipment Supply Bid Opp. No.:

Equipment Install Bid Opp. No.:

Equipment Tag No.:

Specification Reference:

(Authorized Representative of Supply Contractor)

Date

We certify that we have received satisfactory installation instructions from the equipment manufacturer/vendor.

(Authorized Representative of Install Contractor)

Date



Form 102
CERTIFICATE OF SATISFACTORY INSTALLATION

We have completed our checks and inspection of the installation of our equipment as listed below and confirm that it is satisfactory and that any defects have been remedied except any as noted below.

Project:

Equipment Description:

Equipment Supply Bid Opp. No.:

Equipment Install Bid Opp. No.:

Equipment Tag No.:

Specification Reference:

Outstanding Defects:

(Authorized Representative of Supply Contractor)

Date

(Authorized Representative of Install Contractor)

Date

(Authorized Representative of Contractor Administrator)

Date



Form 103

CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE

We certify that the equipment listed below has been continuously operated for a minimum of three (3) consecutive days and that the equipment operates satisfactorily and meets it's specified operating criteria. No defects in the equipment were found and as such are classified as "conforming".

Project:

Equipment Description:

Equipment Supply Bid Opp. No.:

Equipment Install Bid Opp. No.:

Equipment Tag No.:

Specification Reference:

(Authorized representative of Supply Contractor)

Date

(Authorized representative of Install Contractor)

Date

(Authorized representative of Contract Administrator)

Date



Form 104

CERTIFICATE OF SATISFACTORY PROCESS PERFORMANCE

We certify that the process system listed below has been continuously operated and tested as per the Specifications using process fluid and that the equipment meets its Performance Testing and Operating Criteria. No defects in the process system were found and as such are classified as “conforming”.

Project:

Equipment Description:

Equipment Supply Bid Opp. No.:

Equipment Install Bid Opp. No.:

Equipment Tag No.:

Specification Reference:

(Authorized Representative of Supply Contractor)

Date

(Authorized Representative of Install Contractor)

Date

(Authorized Representative of Contract Administrator
i.e. Commissioning Lead or Design Discipline Lead)

Date

(Authorized Representative of City)

Date

APPENDIX G
PROJECT MATERIALS LIST

PROJECT MATERIALS REVIEW - SUMMARY TABLE

ITEM #	DESCRIPTION	QTY REQD ⁽¹⁾	QTY REQD ⁽²⁾	REQ. SPARES ⁽³⁾	CITY SUPPLIED	CONTRACTOR
					MATIERALS	SUPPLIED
					STOCK ⁽⁴⁾	PURCHASE QTY
1	RAIL BASE PLATE – PRIME PAINTED	96	192	10	0	202
2	TEE RAIL - 40#/YD - 16'-0 LG	4	0	0	0	0
2	TEE RAIL - 40#/YD - 30'-0 LG – PRIME PAINTED	12	24	0	14	10
2	TEE RAIL SPLICE BAR FOR 40#/YD RAIL - (1) PAIR – W/ HARDWARE	12	24	2	12	14
2	TEE RAIL CLIPS FOR 40#/YD RAIL	192	384	10	200	194
3	RACK - PRIME PAINTED	92	184	3	95	92
4	RACK SUPPORT - PRIME PAINTED	94	188	10	0	198
7	WHEEL SHAFT - 2.4375" DIA. - W/KEYWAY	4	8	0	0	8
8	DOUBLE FLANGED STEEL WHEEL - FOR 2.4375" DIA. SHAFT	2	4	0	2 ⁽⁵⁾	4
9	PLAIN STEEL WHEEL - FOR 2.4375" DIA. SHAFT	2	4	0	2 ⁽⁵⁾	4
10	FLANGED BEARINGS - FOR 2.4375" DIA. SHAFT	12	24	0	0	24
13	PINION - 17 TOOTH – W/KEYWAY	2	4	0	2	2
14	PINION SHAFT - 2.4375" DIA. W/ (2) KEYWAYS	2	4	0	0	4
26	DRIVE SPROCKET - DOUBLE STRAND - 19 TOOTH – 1.5" DIA. BORE - W/KEYWAY – FOR REDUCER	1	2	0	0	2
26	DRIVE SPROCKET - DOUBLE STRAND - 19 TOOTH – 2.4375 DIA. - W/KEYWAY – FOR DRIVE LINE SHAFT	2	4	0	0	4
27	DRIVEN SPROCKET - DOUBLE STRAND - 45 TOOTH - 2.4375" BORE - W/KEYWAY	3	6	0	0	6
28	DRIVE CHAIN - DOUBLE STRAND - W/OFFSET & CONN. LINK - FOR REDUCER TO DRIVE LINE SHAFT SPROCKET	1	2	0	0	2
28	DRIVE CHAIN - DOUBLE STRAND - W/OFFSET & CONN. LINK - FOR DRIVE LINE TO PINION SHAFT SPROCKET	2	4	0	0	4
30	PILLOW BLOCKS - FOR 2.4375" DIA. SHAFT	6	12	0	0	12
32	DRIVE LINE SHAFT - SHORT - 2.4375" DIA. – W/KEYWAYS	1	2	0	0	2
32	DRIVE LINE SHAFT - LONG - 2.4375" DIA. – W/KEYWAYS	1	2	0	0	2
34	FLEXIBLE COUPLING - 2.4375" BORE - W/KEYWAY - BOTH SIDES – FOR DRIVE LINE SHAFT	1	2	0	0	2
11	SPACER 2-1/2" PIPE x 2"LG	4	8	0	0	8
12	SPACER 2-1/2" PIPE x 4"LG	4	8	0	0	8

1) RECOMMENDED BY WALKER PROCESS IN QUOTE 22088-1 FOR REFURBISHMENT OF ONE CLARIFIER

2) REQUIRED FOR REFURBISHMENT OF CLARIFIER Nos.1 AND 2

3) RECOMMENDED BY WALKER PROCESS IN QUOTE 22088-1 FOR STOCK OF SPARES

4) QTY IN STOCK IS BASED ON EMAIL HISTORY FROM THE CITY REGARDING RECENT PURCHASES, AND IS NOT BASED ON WAREHOUSE MATERIALS TRACKING SYSTEM RECORDS. ACTUAL STORED STOCK OF PARTS MAY DIFFER AND SHOULD BE CONFIRMED BY CITY MATERIALS MANAGEMENT.

5) CITY MAINTENANCE TO KEEP ONE SET OF FLANGED WHEELS AND FLAT WHEELS AS REPLACEMENTS

APPENDIX H
ENVIRONMENTAL MANAGEMENT POLICY



Water and Waste Department
Wastewater Services Division

ENVIRONMENTAL PRESERVATION AND COMPLIANCE

Environmental Preservation and Compliance

Working on behalf of Wastewater Services, your performance during all contracted obligations is critical to our commitment to protect the environment and comply with all environmental legislation. Please read our attached Environmental Policy.

Without limiting or otherwise affecting the generality or application of any other term or condition of the Contract, you shall, at no additional cost to the Wastewater Services Division:

- a) strictly comply with all applicable environmental laws and regulations and have suitable corrective and/or preventive measures in place to address any previous environmental warnings, fines or convictions;
- b) do or cause to be done all things required or ordered, and shall bear all costs and expenses for same, to mitigate environmental damage caused, directly or indirectly, by itself or by its servants, agents, employees or subcontractors, accidentally or as a result of practices that are or may be in contravention of the Contract or any environmental laws or regulations, or to prevent any or all of the same;
- c) ensure that all persons engaged in the performance of the Work and the Contract shall not dispose of oil or waste materials in any way which might cause pollution of land, water, lakes, rivers, streams;
- d) ensure that all persons engaged in the performance of the Work and the Contract shall follow any Safe Work Procedures provided by the contract administrator;
- e) ensure the Work, and all work sites are clean and free from fire hazards and other hazards, accumulations of waste materials, rubbish and debris;
- f) create as little waste as reasonably possible during the course of the Work and handle all waste created in the course of the Work in an environmentally preferable, and legal, manner;
- g) in respect of the Work, use all resources as efficiently and reasonably possible;
- h) the person who is responsible for a spill or who has custody and control of the substances involved in a spill must **immediately** notify the designated official (see contact list below), and must provide all information about the spill, including:
 - i) the date and time of the spill;
 - ii) the content and quantity of the spill;
 - iii) the location of the spill;
 - iv) the cause and nature of the spill;
 - v) the action completed and any work still in progress to mitigate the spill;
 - vi) the name and contact information of the person reporting the spill.
- i) the person who is responsible for a spill or who has custody and control of the substances involved in a spill must notify all appropriate regulatory agencies e.g. Fisheries and Oceans Canada, Manitoba Ministry of Sustainable Development as required by law;
- j) if a spill poses an immediate danger to human health or safety, property or the environment, the person responsible for the spill or who has custody and control of the substances involved in a spill must call 911 to report the spill;
- k) the person who is responsible for a spill or who has custody and control of the substances involved in a spill must take all reasonable measures to:
 - i) contain the spill;
 - ii) reduce the risk of harm to human health and safety, property, and the environment;
 - iii) clean up the spill and contaminated residue and dispose of spill material appropriately, and
 - iv) restore the affected area to its condition before the spill.
- l) the person who is responsible for a spill or who has custody and control of the substances involved in a spill must submit a written report to the Purchaser within five working days of the spill, containing information required to determine:
 - i) information required in (h); and
 - ii) actions necessary to reduce the effect of the spill and to prevent future spills.



Water and Waste Department
Wastewater Services Division

ENVIRONMENTAL PRESERVATION AND COMPLIANCE

Contact List	
Federal (Winnipeg Offices) Fisheries and Oceans Canada	204.983.5163
Provincial Manitoba Ministry of Sustainable Development	204.944.4888
Wastewater Services (normal work hours) Collection System Issue: Superintendent of Wastewater Collection	204.986.3492
Wastewater Treatment Plant Issue: Supervisor for NEWPCC: Supervisor for SEWPCC: Supervisor for WEWPCC:	204.986.4845 204.986.6159 204.986.5220
Wastewater Services (after hours) Collection System Issue: Wastewater Services Control Centre	204.986.7948
Wastewater Treatment Plant Issue:	204.794.4468



Water and Waste Department
Wastewater Services Division

ENVIRONMENTAL PRESERVATION AND COMPLIANCE

Winnipeg
Water and Waste Department

Environmental Management Policy

We have an Environmental Management System (EMS) to help us manage our environmental impacts and risks, and improve our environmental performance.

As part of this program, we must all take responsibility for minimizing the effects of our work activities on the environment.

The Environmental Management System also requires that we record all operational and EMS non-conformances on the appropriate forms.

The Water and Waste Department's sewage treatment facilities, and wastewater collection and land drainage systems, aim to achieve excellence in environmental services, pollution prevention, and protection of public health through a commitment to continually improving the Environmental Management System.

We are committed to:

1. Understanding and respecting the views of our customers, employees, communities and stakeholders when planning and undertaking our activities.
2. Remaining current with advancing and innovative technology and management practices in our facilities.
3. Ensuring awareness, training and involvement of all staff to enable them to conduct their work in an environmentally responsible manner and to play a full role in continual improvement.
4. Aiming for best performance and sustainability in all aspects of our business to ensure compliance, at the highest level, with legislative requirements and our own standards.
5. Reviewing our environmental objectives and targets annually to ensure improvement in our environmental performance.


Director, Water and Waste Department

December 2011

APPENDIX I
TESTLABS INSPECTION REPORTS

File No.: 19K-TL3575
City of Winnipeg File No.: S-1074

Final Report
Radiographic (X-ray) Inspection of the Aluminum Alloy Primary Clarifier Bridge #3 At the South End Sewage Treatment Plant (SEWPCC)

Prepared For:

The City of Winnipeg
Engineering Division, Water and Waste Department
110-1199 Pacific Ave
Winnipeg, Manitoba
R3E 3S8

Attention:


Josh Flynn, P.Eng
Project Engineer,
Tel: (204) 986-3251
JFlynn@winnipeg.ca

Brian Station, P.Eng
Senior Project Engineer
Tel: (204) 986-7642
bstation@winnipeg.ca

June 8, 2020


Dr. Wayne W. Tennessee, P.Eng.
Senior Metallurgist and Corrosion Engineer
Member, National Association of Corrosion Engineers (NACE)



Sukhdeep Singh
3rd year Mechanical Engineering Student
Student Member of National Association of Corrosion Engineers (NACE)
Student Member Engineers Geoscientists Manitoba (EGM)

Carly Van Ryssel, B.A.
Forensic Photographer & Metallurgical Technician



1.0 Introduction

The City of Winnipeg working, closely with the KGS Group, requested radiograph inspection of high stress locations on the aluminum bridge over Primary Clarifier Tank #3 at the SEWPCC.

The KGS Group had carried out a linear Finite Element Analysis (FEA) of the Primary Clarifier No. 3 Traveling Bridge (See Appendix A).

Testlabs reviewed the KGS Group Finite Element Analysis which identified seven high stress locations for further radiographic inspection.

- The purpose of the radiography was to confirm the structural integrity of the aluminum bridge and confirm there is no cracking occurring within the structure.
 - The radiographic inspection was carried out at all four corners of the bridge structure plus Location #11B. It was not possible to position the electric x-ray generator at certain locations.

Important Notes:

There was insufficient time to coordinate the re-inspection of the two existing repair points at Location # 10B and #11B due to:

1. *Annual shut down schedule for the asset (before increased flows due to the spring melt)*
2. *Schedule requirements for the ongoing major upgrading and expansion project.*

2.0 Radiographic Inspection

2.1 Limitations/Constraints of the Radiographic Inspection

- For the radiography of steel structures, a radioisotope source is delivered to the film location via a cable which is readily located to facilitate an inspection of the steel weld.
- However, the x-raying of aluminum requires an electric x-ray generator which, in this case, weighs approximately 100lbs (see Fig. B-1)
- Secondly, the x-ray tube requires positioning approximately 36-inches from the film. Consequently, a wooden platform was fabricated to fit between the tubular frame of the bridge and, at the same time, position the x-ray tube at the correct distance from the film.
 - Because of the 36-inch space requirement from the film, two of the seven high stress locations outlined in the KGS Group FEA report could not be radiographed.
- Fig. 14 a to c show a typical set up to complete a radiographic (x-ray) inspection of a weld.

2.2 Radiographic Inspection

1. South-West Corner of Bridge, Location 10B – Top of Tube ‘B’

An extremely bad weld (see radiographic image, Fig. 9a)

- Unusually wide weld – four beads wide indicates a very inexperienced welder: when welding 0.25-inch thick material.
- Crack was never ground out, but simply covered with four weld passes.
- Excessive porosity (perhaps indicating lack of cleanliness prior to welding).
- Fig. 9b shows photograph of the four weld passes

Comment: *Unacceptable weld quality.*

2. South-East Corner of Bridge, Location 11A

- The arrows denote a large amount of porosity present in the three stitch welds shown in the radiograph (see Fig. 10)

Comment: *Porosity in the weld can act as a stress concentration site to initiate fatigue cracking.*

Unacceptable weld quality for a structure subject to fatigue loading and a history of weld cracking.

3. North-East Corner of Bridge, Location 1A

- The arrows indicate two areas of gas porosity in the middle stitch weld (see Fig. 11)

Comment: *Outer stitch welds: acceptable weld quality
Middle stitch weld: unacceptable weld quality*

4. North-West Corner of Bridge, Location 1B

- The arrows denote six areas of gas porosity in the stitch weld. (see Fig.12)

Comment: *Weld quality is unacceptable.*

5. South-West Corner of Bridge, Location 11B

- The arrows denote approximately six locations of large gas porosity in the stitch weld (see Fig. 13)

Comment: *Weld quality is unacceptable*

- Fig. 14a shows an overall view of the radiographic set-up to inspect three of the stitch or intermittent welds attaching the gusset plate to the bottom of the aluminum tube ‘B1’.

- Fig. 14b shows how the 17-inch long film was held underneath stitch welds W1, W2 and W3.

3.0 Conclusions

1. The radiographic inspection of other “rough appearing” repair welds on the bridge should be done as the “rough” appearing welds should be viewed as a possible source of cracking.
2. Some of the welding at location #2A appears very rough / poorly done and may indicate the site of an attempted weld repair.

Comment: *It is doubtful that any crack which had been present, was properly removed by grinding and then rewelded.*

Recommendation: *The rough welding at Location #11B (shown in Fig. 5) should be ground out and re-welded to ensure cracking will not continue / re-occur.*

3. The large amounts of porosity in the stitch (intermittent) welds are unacceptable as the porosity will act as stress concentration sites to initiate fatigue cracking.
4. In conclusion, an aluminum alloy was selected for this application for its corrosion resistance. However, aluminum welding required a very skilled workforce to produce sound, porosity free welds which will offer acceptable resistance to fatigue cracking.

4.0 Recommendations

1. Much engineering effort has been made to develop a fatigue stress analysis scenario, but without actually seeing “beach” or “clam shell” marks on a fracture surface to positively identify fatigue cracking as the failure mechanism.
2. Consequently, when the portion of 4-inch X 4-inch tube at Location #11B (where the side fish plate is located) is removed, this section of previously cracked/ weld repair tube should be submitted for a metallurgical failure analysis to determine:
 - a) Use radiography to determine the quality of the welding used to repair cracks on the side and top of the 4-inch X 4-inch X 0.25-inch aluminum tube.
 - b) Examine the fracture surface of any cracking to:
 - i. verify the presence of fatigue cracking and the creation of a severe fatigue loading scenario.
 - ii. The role that weld defects (inclusions, blowholes) may have played in initiating the fatigue crack.
3. Although radiographic weld inspections are costly and require rigging/set-up requirements, every effort should be made to ensure all aluminum weld repairs should be checked with radiography (when possible) to ensure acceptable weld quality and, in turn, an acceptable service life.

4. In conclusion, welding done in accordance with CSA standards, supervised by a professional engineer, followed by a radiographic inspection (where possible) would ensure the service life of the Clarifier Bridge.
5. Re-inspection of the repairs at Location #11B should be carried out every 6 to 9 months to discover any cracking which may have occurred.

Prepared for: City of Winnipeg

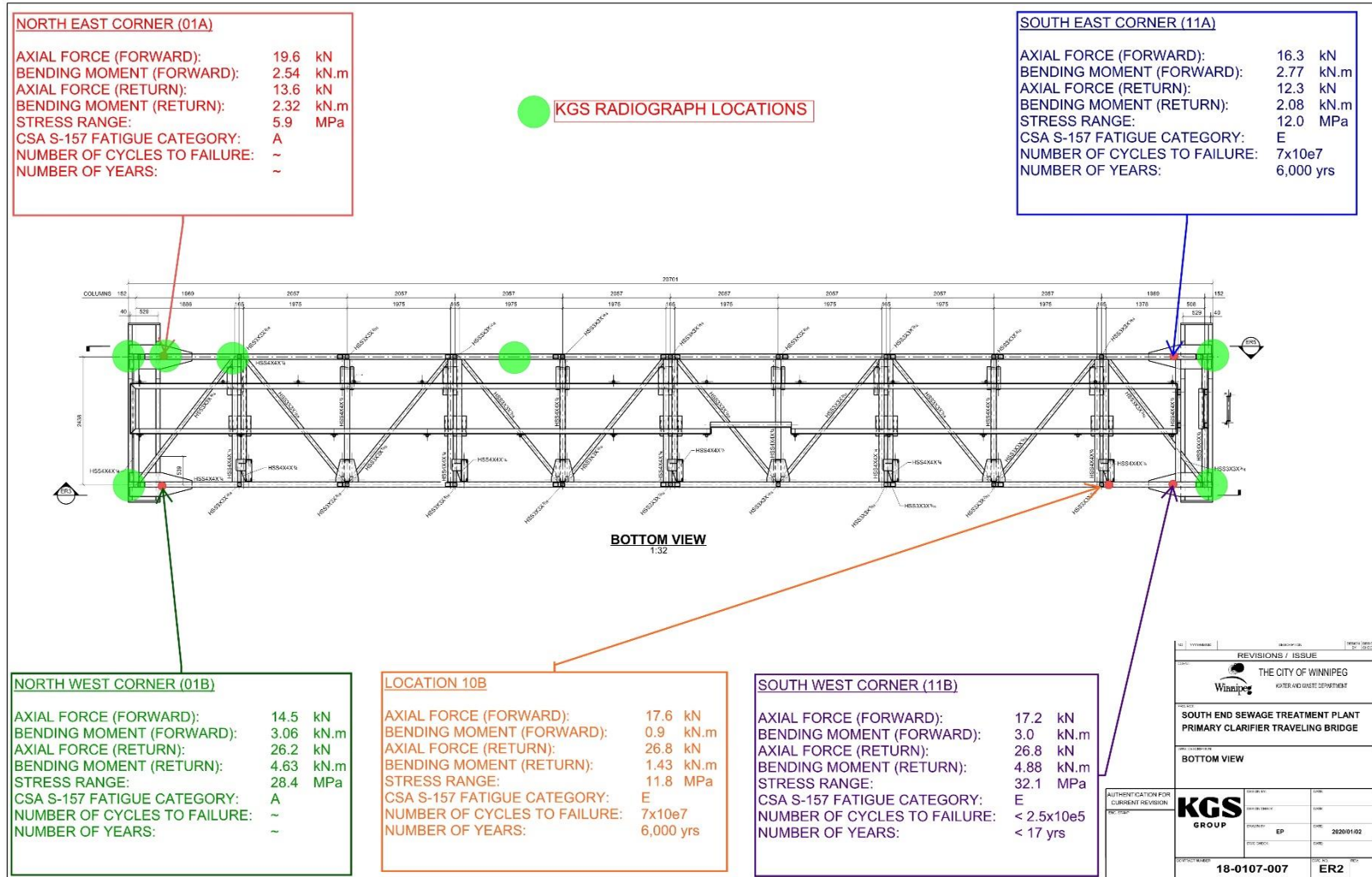


Fig. 1: Drawing showing radiographic inspection sites as requested by KGS Group

Prepared for: City of Winnipeg

a)

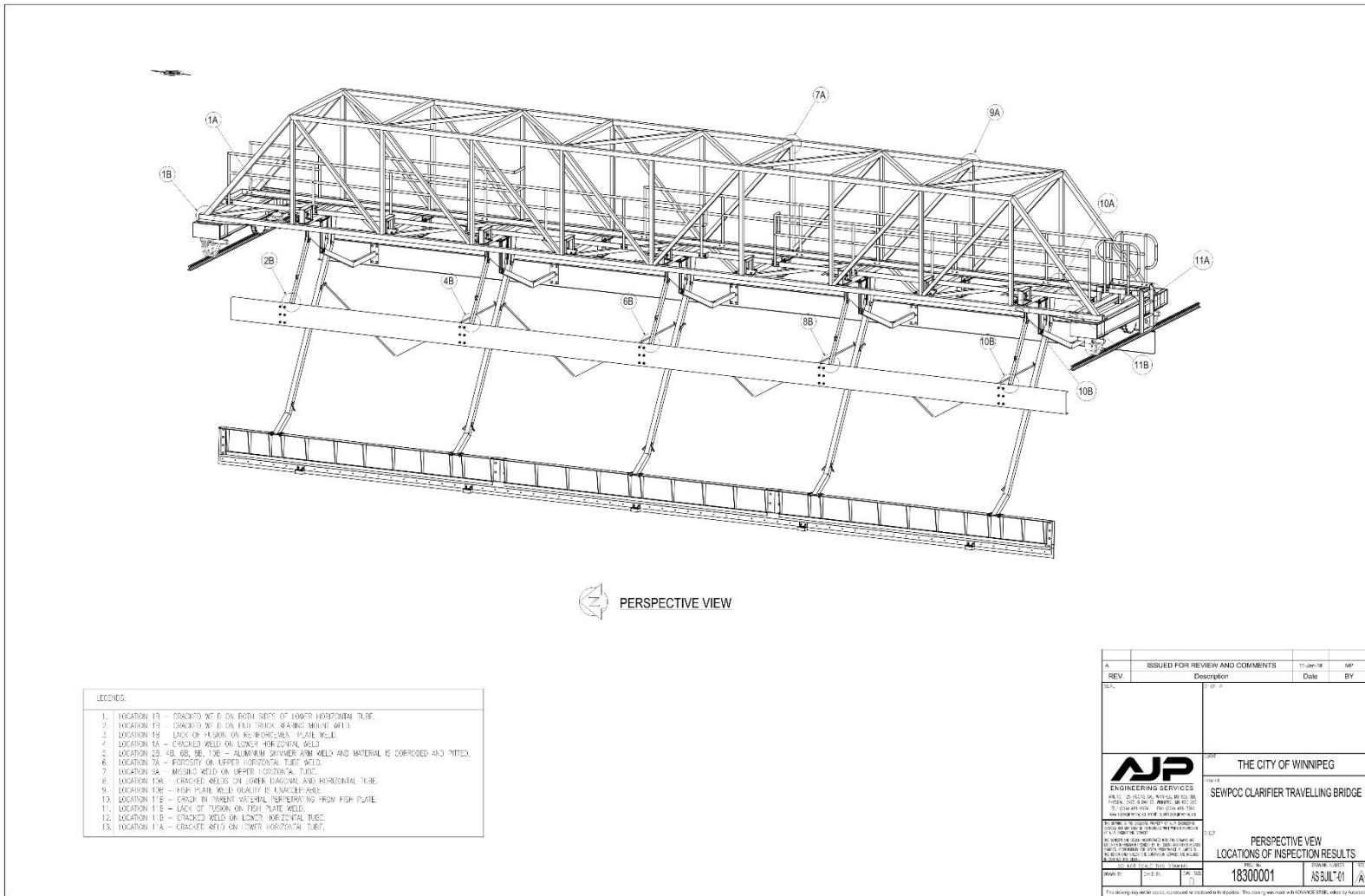


Fig. 2: AJP Drawing showing labelling of welds of interest

- Testlabs radiographic test sights are circled in orange.

b)

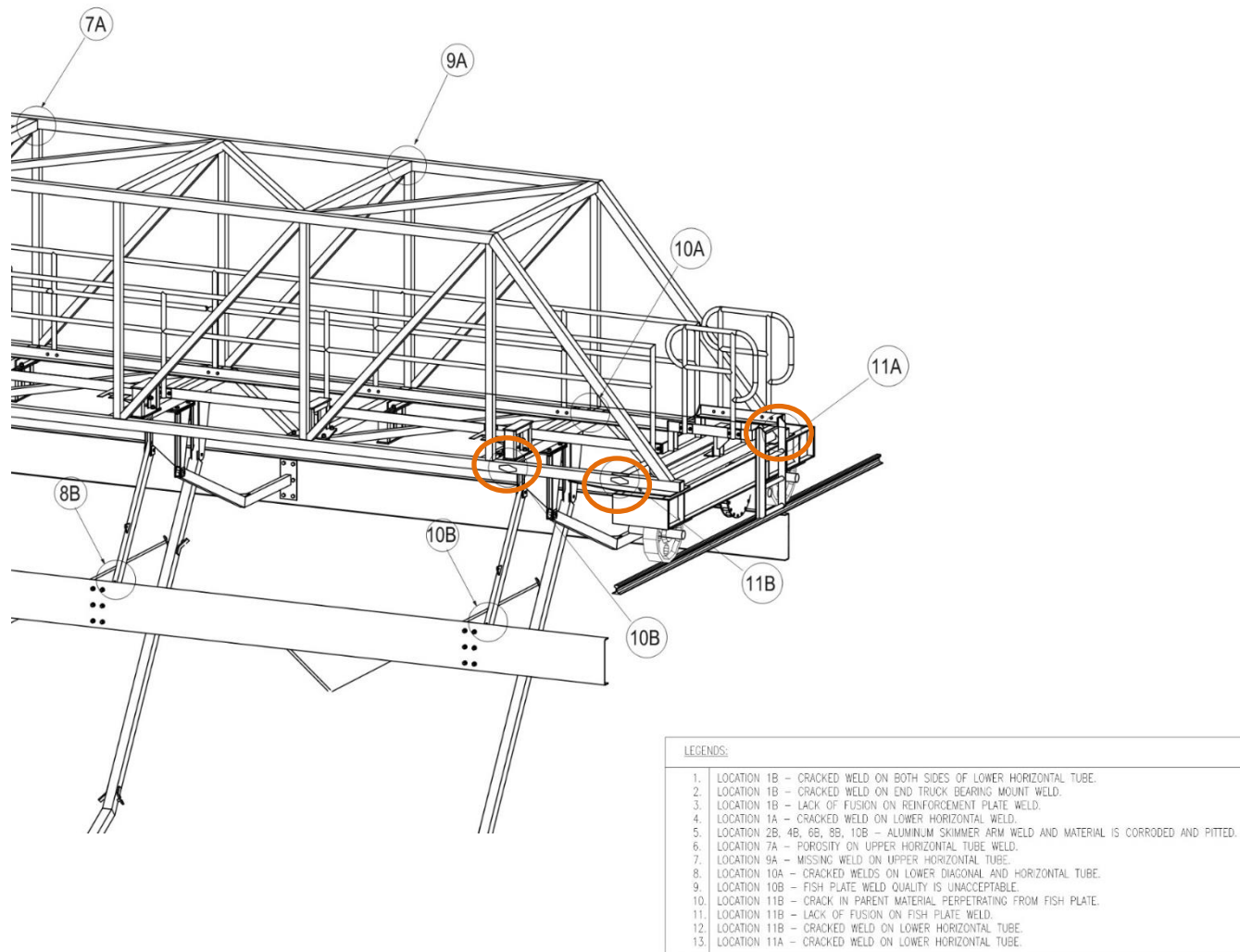


Fig. 2 (cont'd): Location of Radiographic Test Locations - Location #10B, #11A and #11B

c)

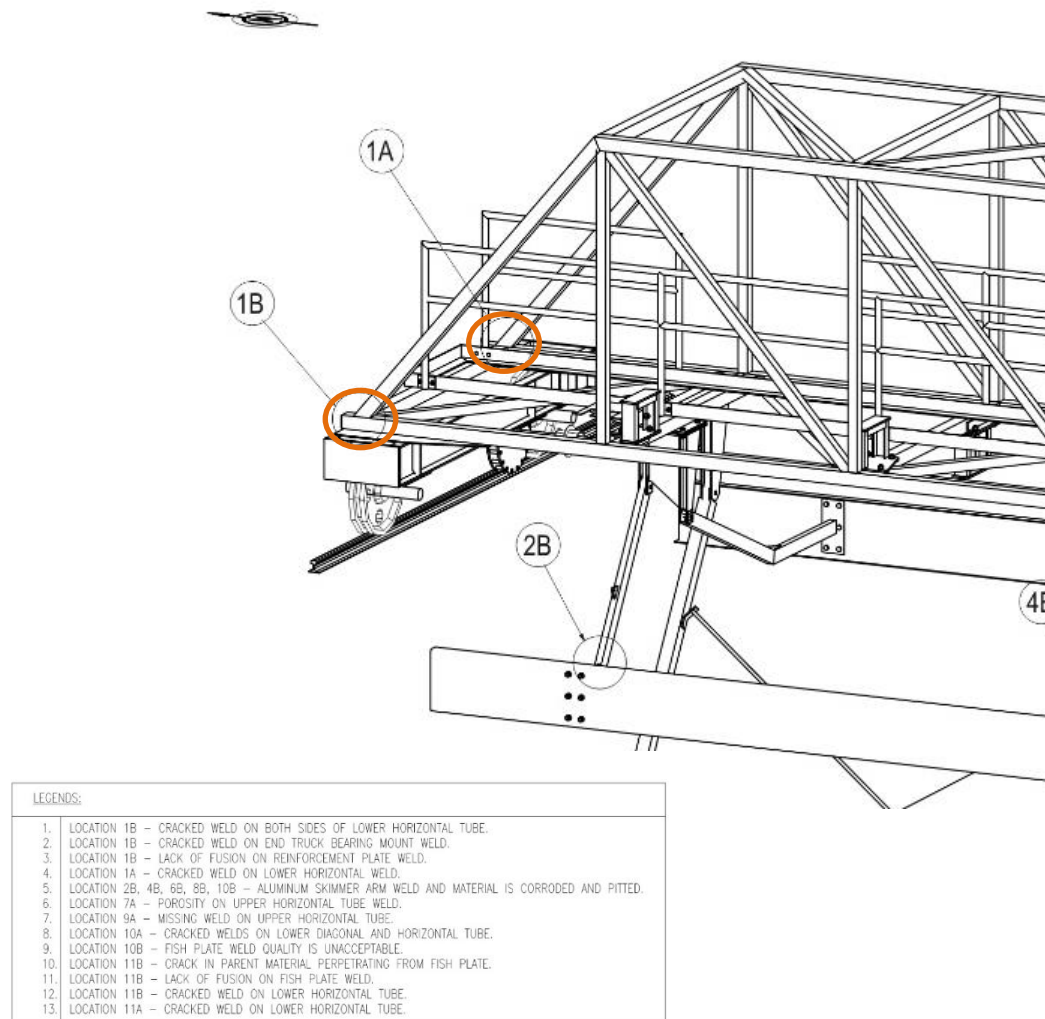


Fig. 2 (cont'd): Location of Radiographic Test – Locations #1A and #1B

Figure 4
Fatigue stress ranges for design of aluminum components and connections
 (See Clauses 23.2.2, 23.2.3, 23.6.1, 23.6.2, and C23.2.)

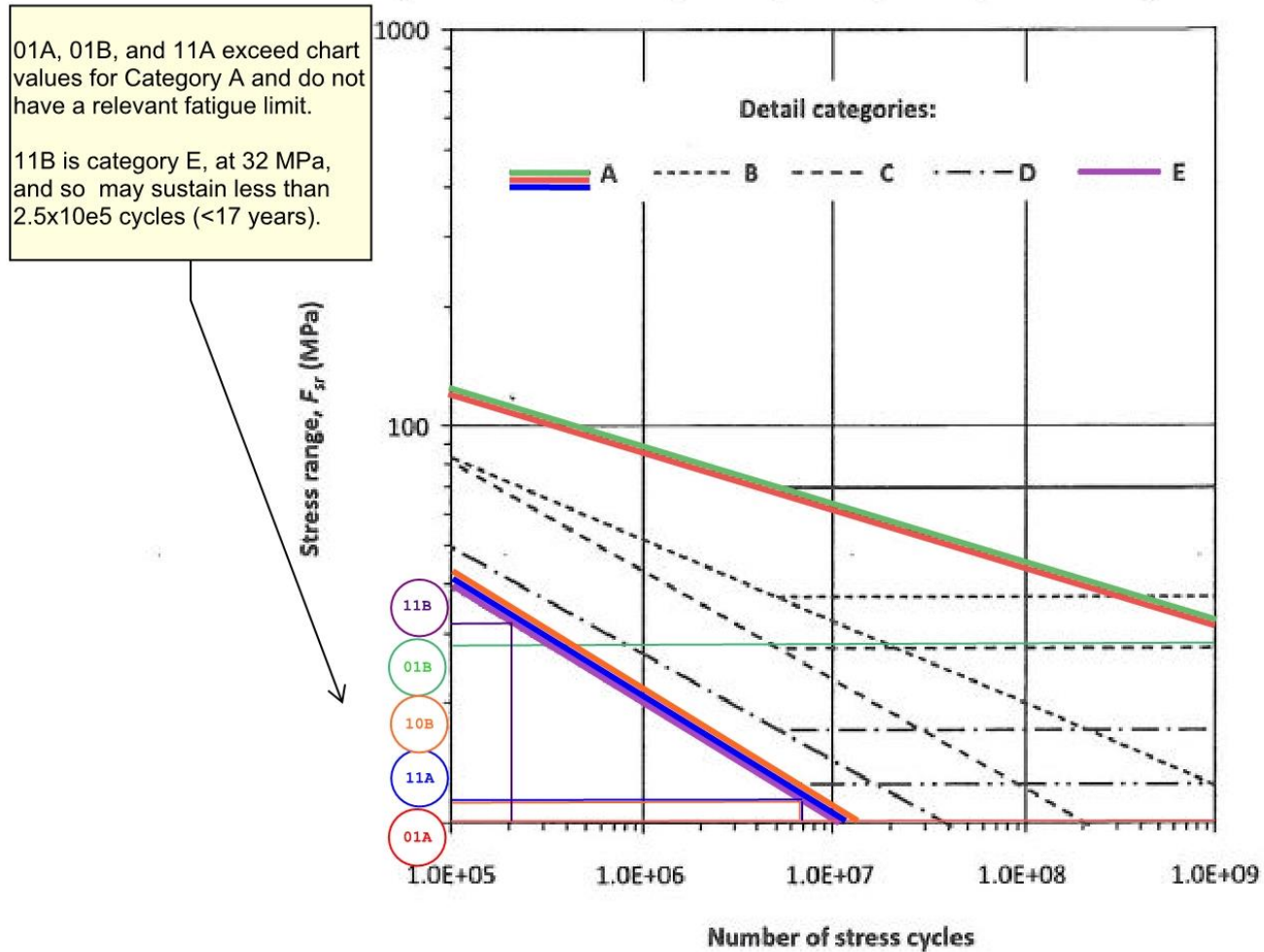


Fig. 3: Fatigue Stress Ranges (KGS Group document)

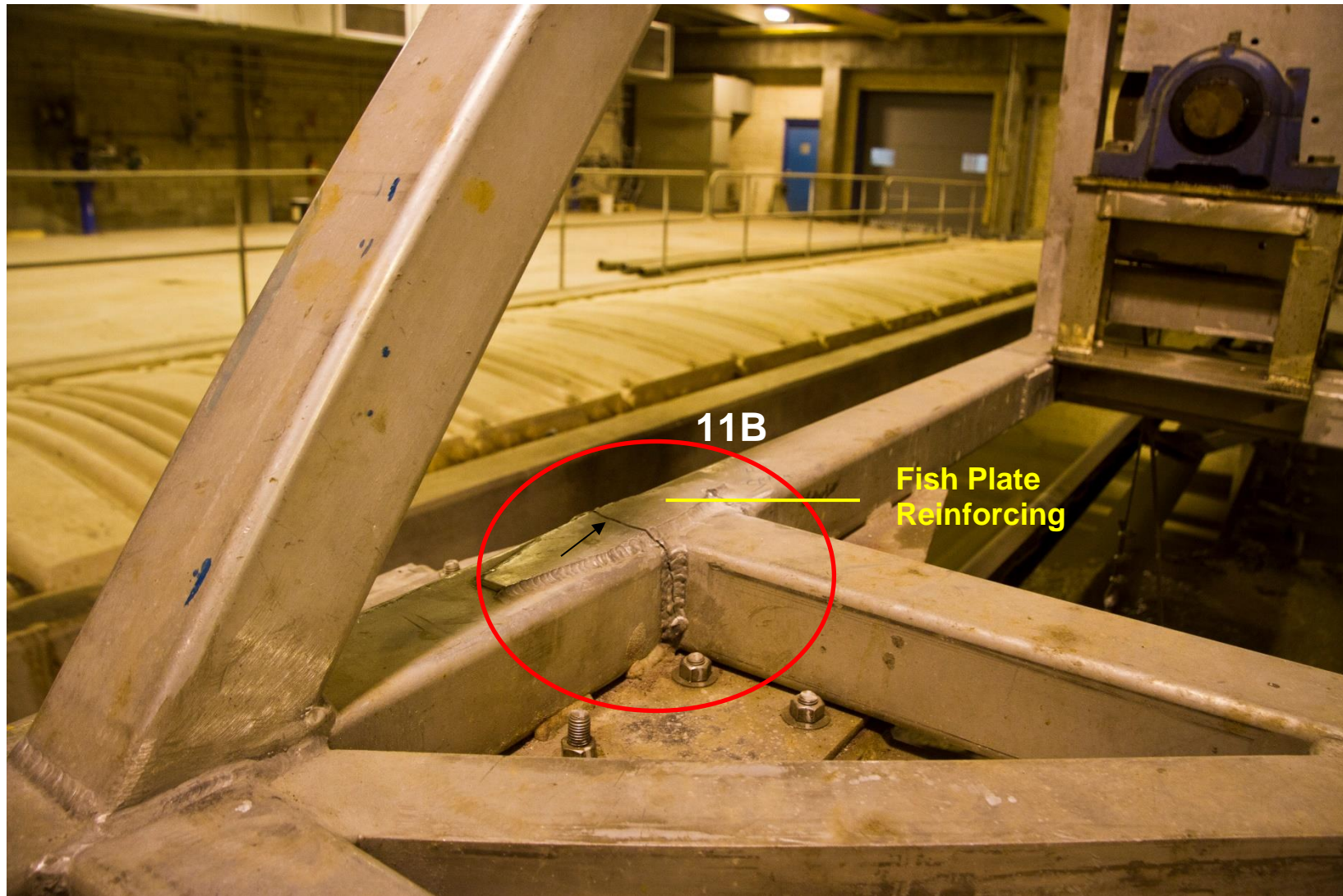


Fig. 4: Overall; view of South-West Corner of Bridge, Location #11B Showing:

1. Fish plate reinforcing on top of the square tubular chord.
2. Arrow indicating a crack through fish plate.

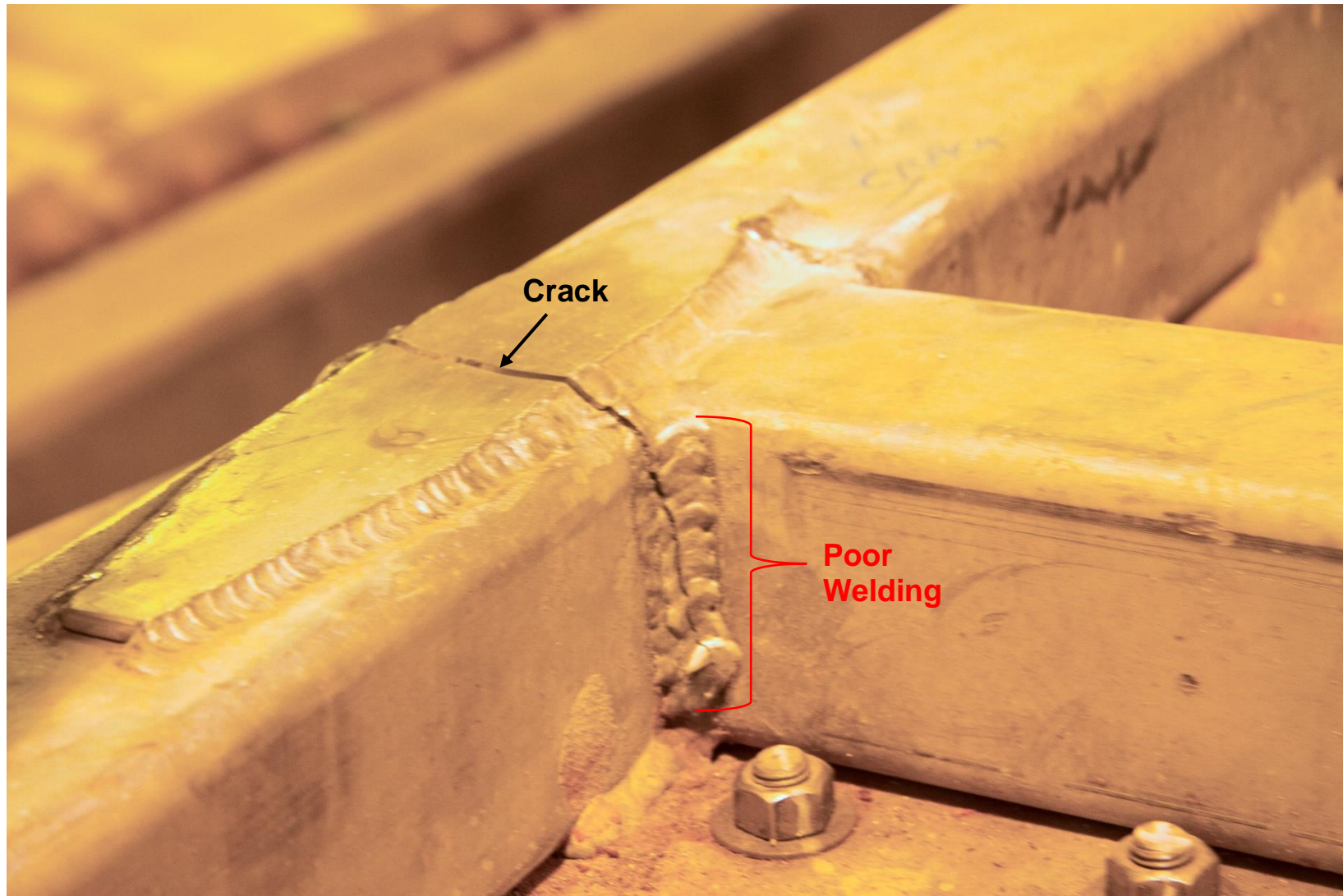


Fig. 5: South-West Corner of Bridge, Location #11B – Cracking

- Enlarged view showing details of the extensive, recent cracking at this location.
- Poor vertical welding at the corner.



Fig. 6: South-West Corner of Bridge, Location #11B

- View of fish plate reinforcing on the west side of square tube.
- Arrows indicate most recent crack.

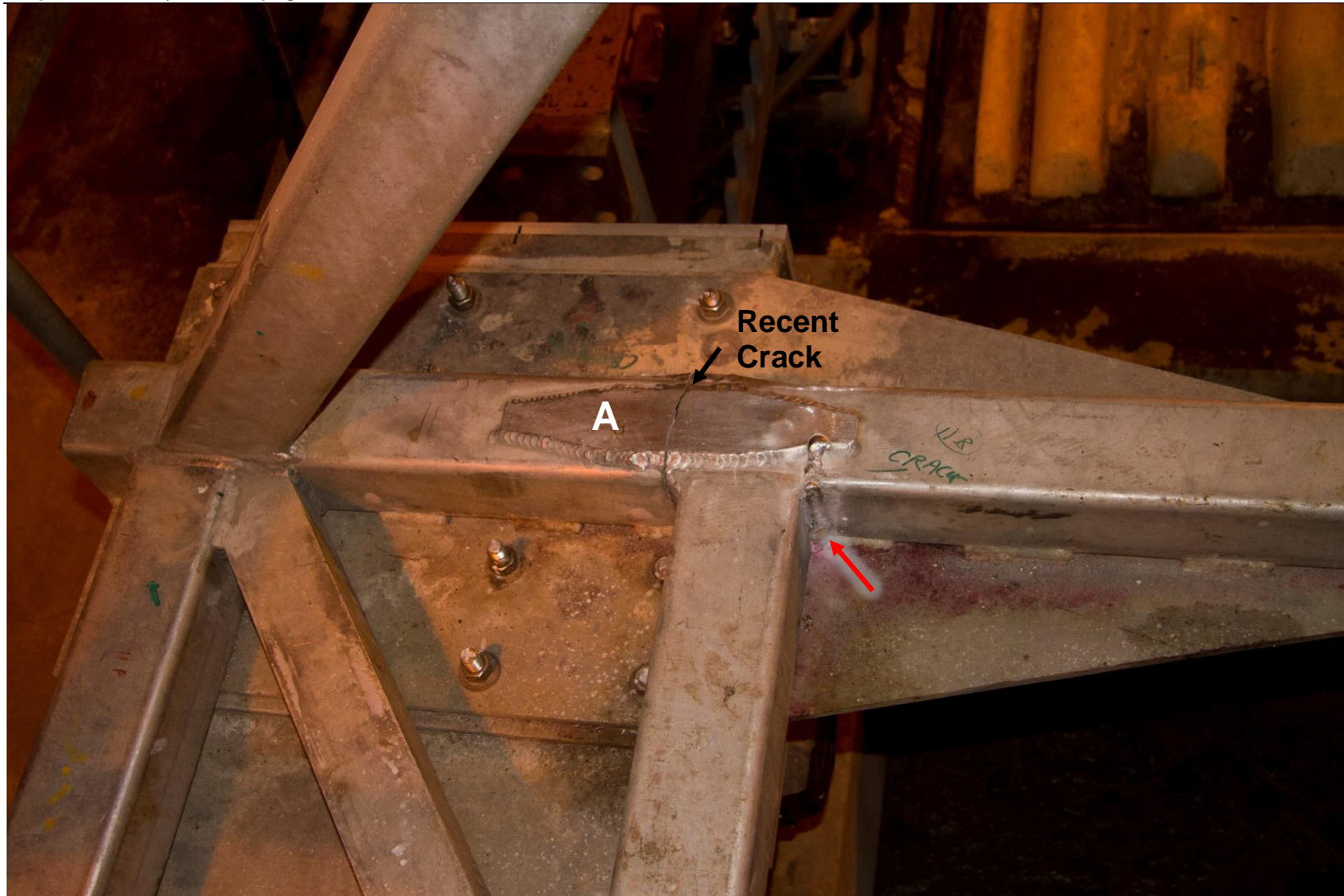


Fig. 7: South-West Corner of Bridge, Location #11B

- Location of most recent crack on the Bridge over Clarifier No. 3 (discovered approximately November 2019)
- Red arrow indicates the location of a weld crack discovered several months ago (and repaired)

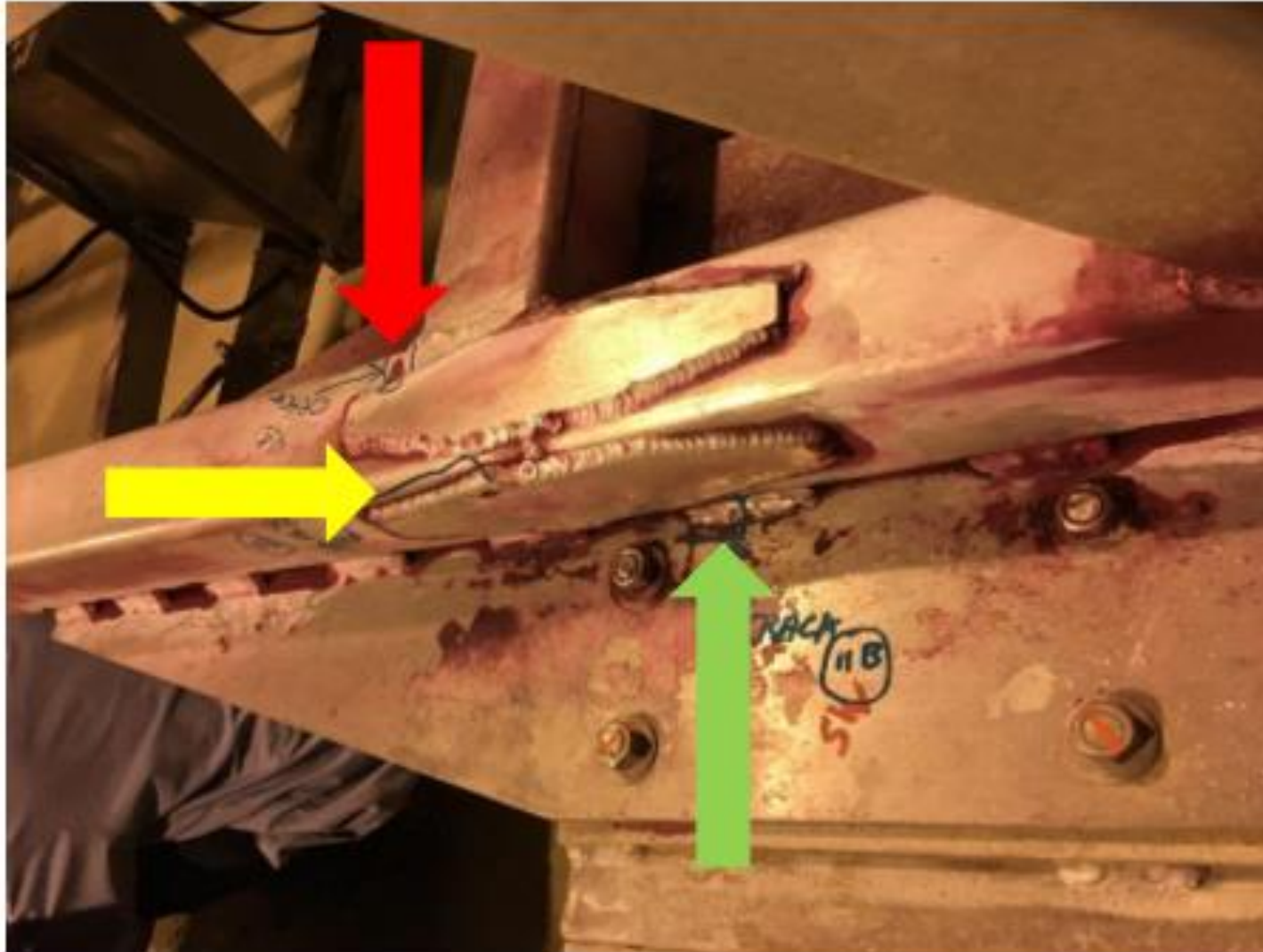


Fig. 8: South-West Corner of Bridge, Location #11B

- Previous history of cracking recorded by AJP Engineering Services
- **** No crack in fish plate 'A', during December 18, 2017 inspection. ****
 - Red arrow shows location of crack in parent metal
 - Yellow arrow shows lack of fusion on vertical fish plate
 - Green arrow shows crack in stitch weld

a)

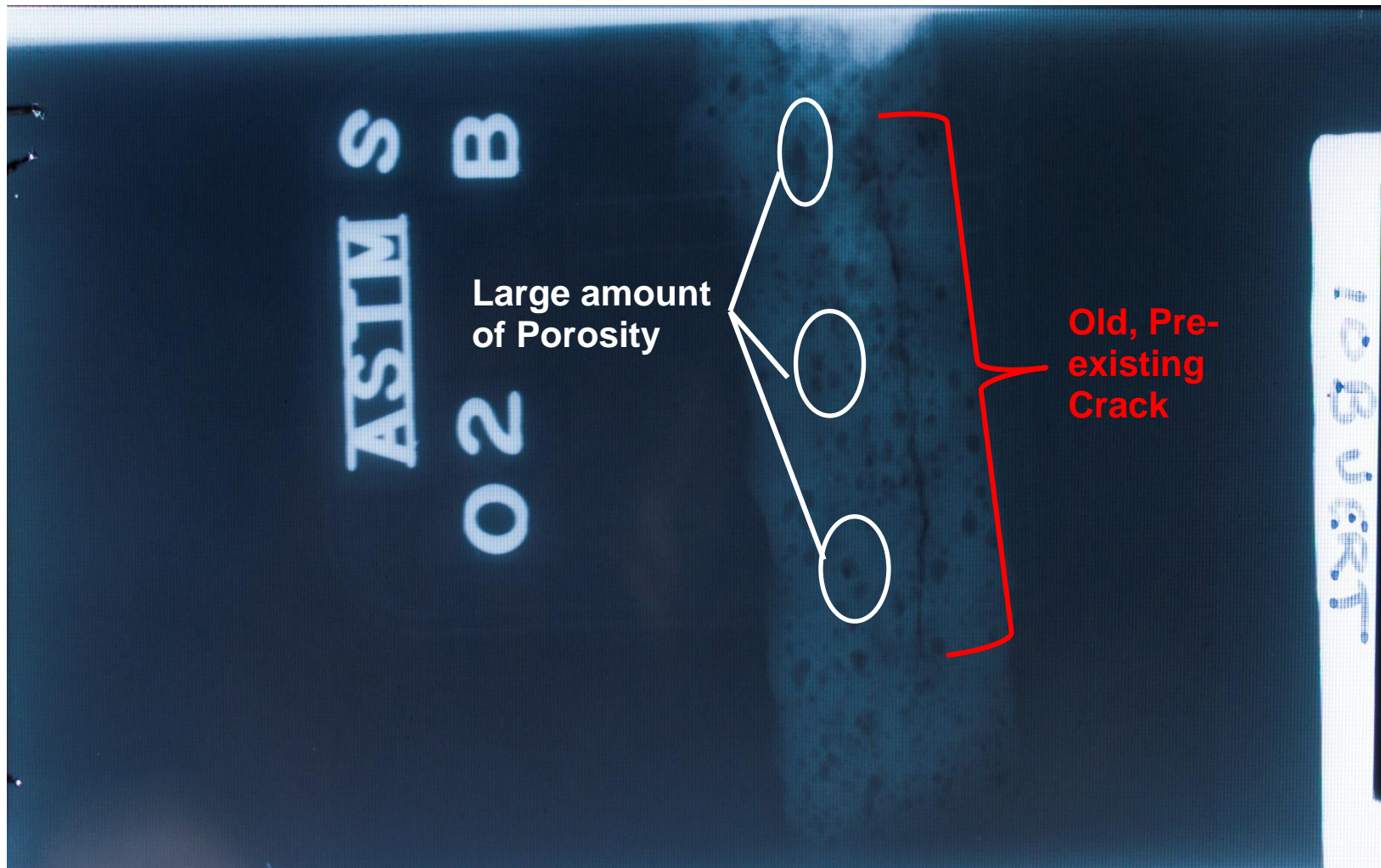


Fig. 9: South-West Corner of Bridge, Location 10B - Vert

An extremely bad weld:

1. Unusually wide weld – 4 beads wide indicates a very inexperienced welder; when welding 0.25in. thick material.
2. Crack was never ground out, but simply covered with 4 weld passes.
3. Excessive porosity (perhaps indicating lack of cleanliness prior to welding).

Comment: *Unacceptable weld quality*

b)

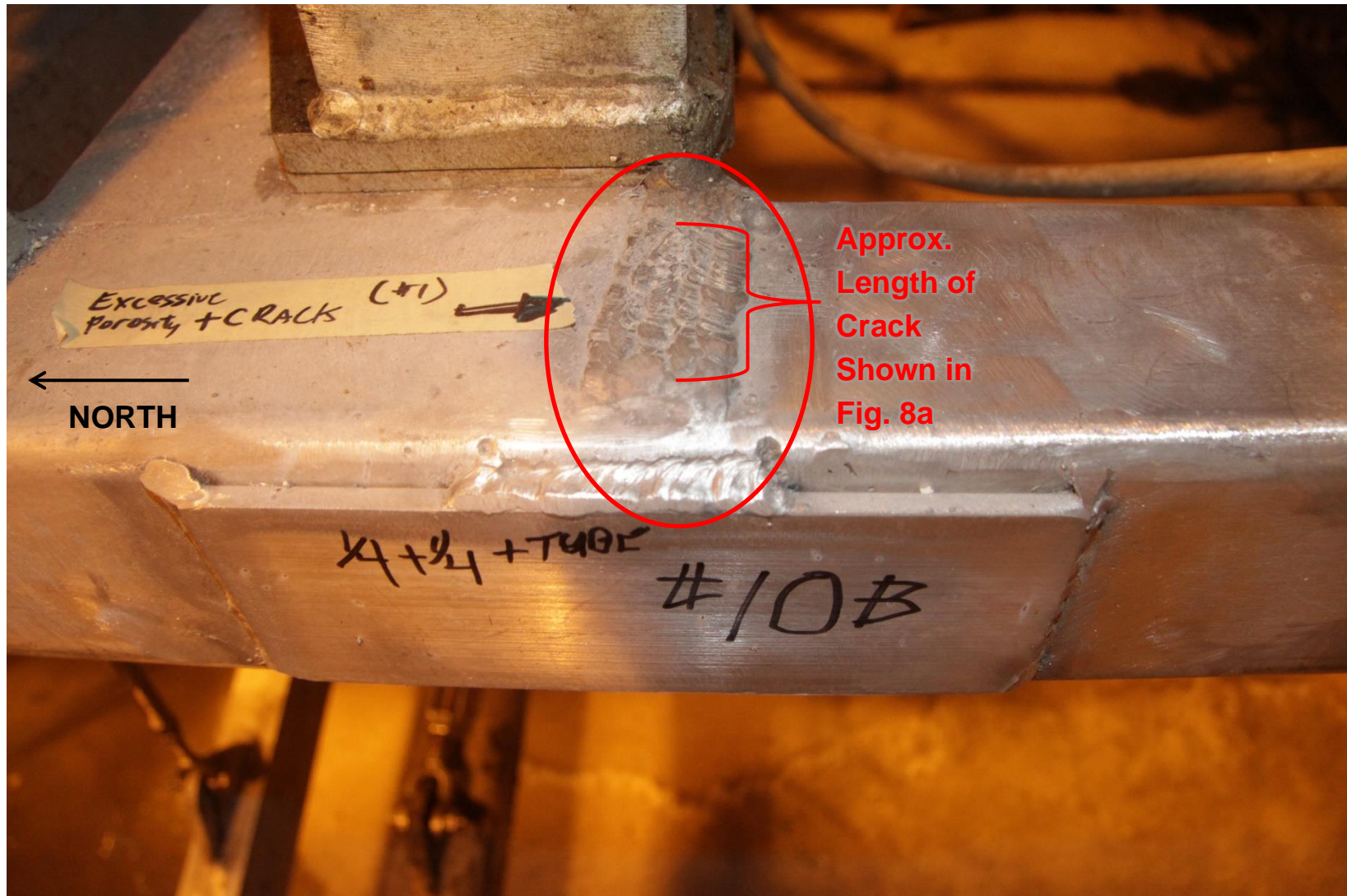


Fig. 9 (cont'd): South-West Corner of Bridge, Location 10B

- Location of crack covered with multi-pass weld

Prepared for: City of Winnipeg

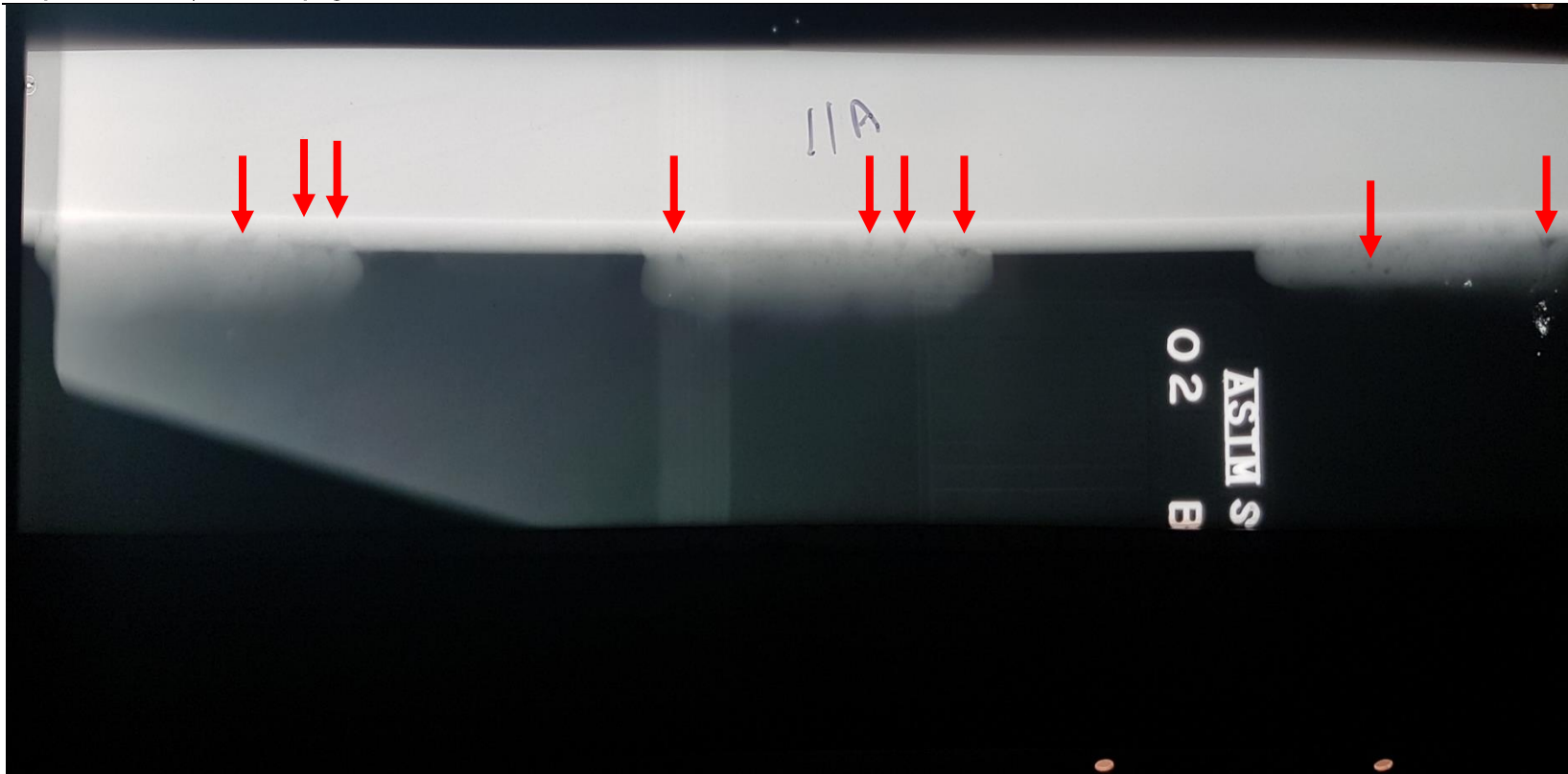


Fig. 10: South-East Corner of Bridge, Location 11A

- The arrows denote a large amount of porosity present in the 3 stitch welds shown in the radiograph

Comment: *Unacceptable weld quality.*

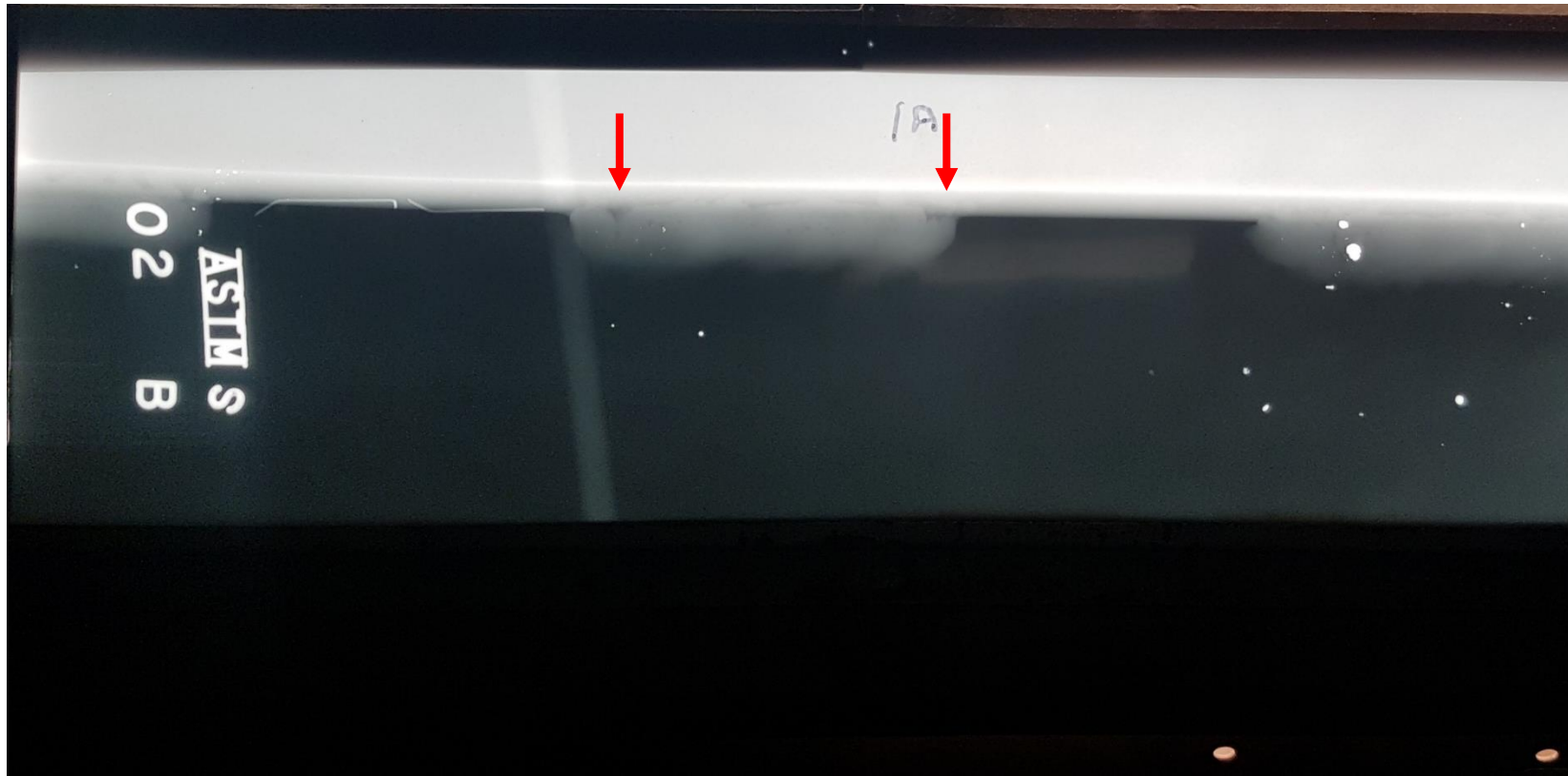


Fig. 11: North-East Corner of Bridge, Location 1A

- The arrows indicate 2 areas of gas porosity in the middle stitch weld.

Comment: *Acceptable weld quality for two outer stitch welds
Middle stitch weld; unacceptable weld quality.*

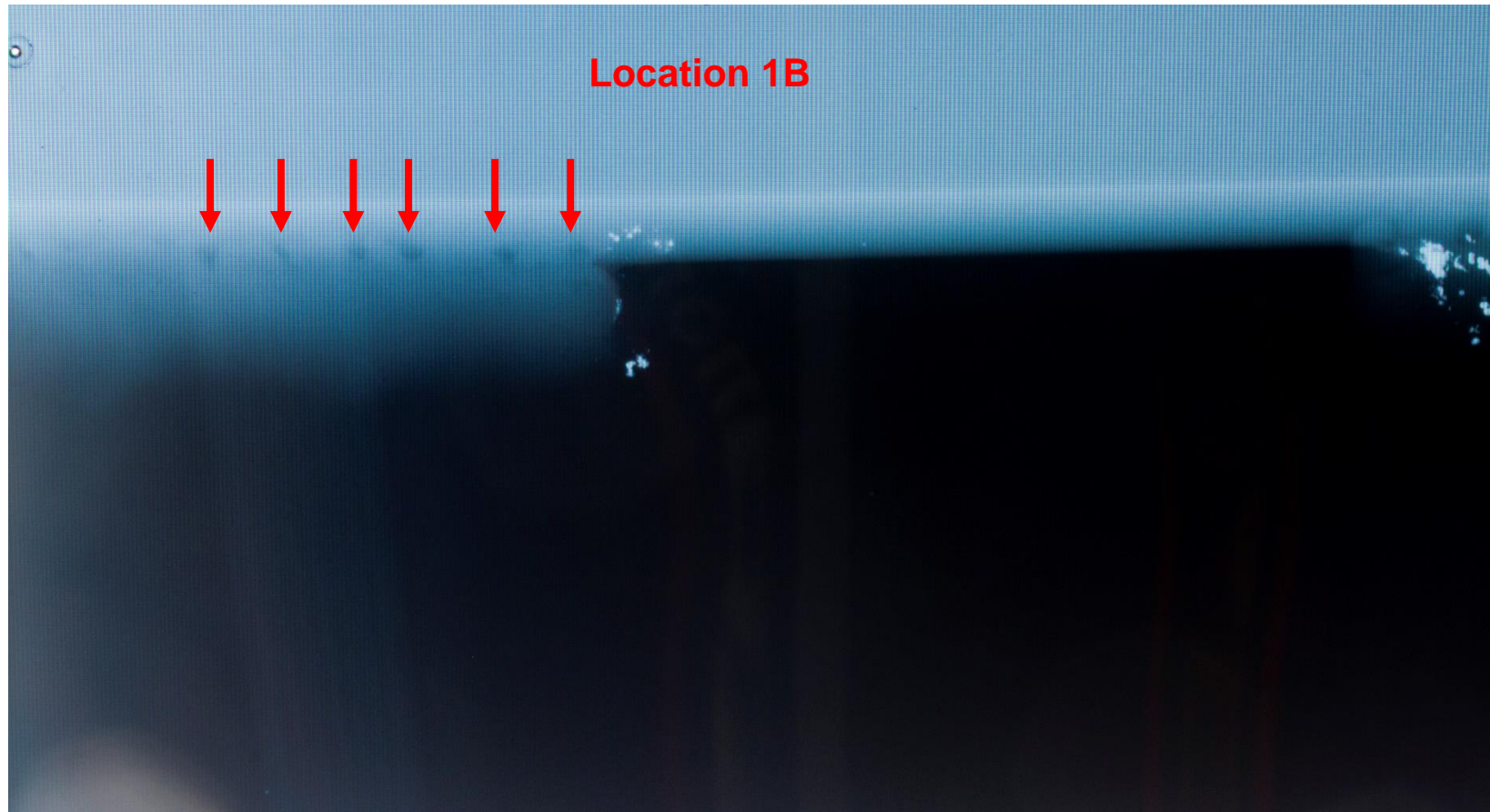


Fig. 12: North-West Corner of Bridge, Location 1B

- The arrows denote 6 areas of gas porosity in the stitch weld.

Comment: *Weld Quality is unacceptable.*

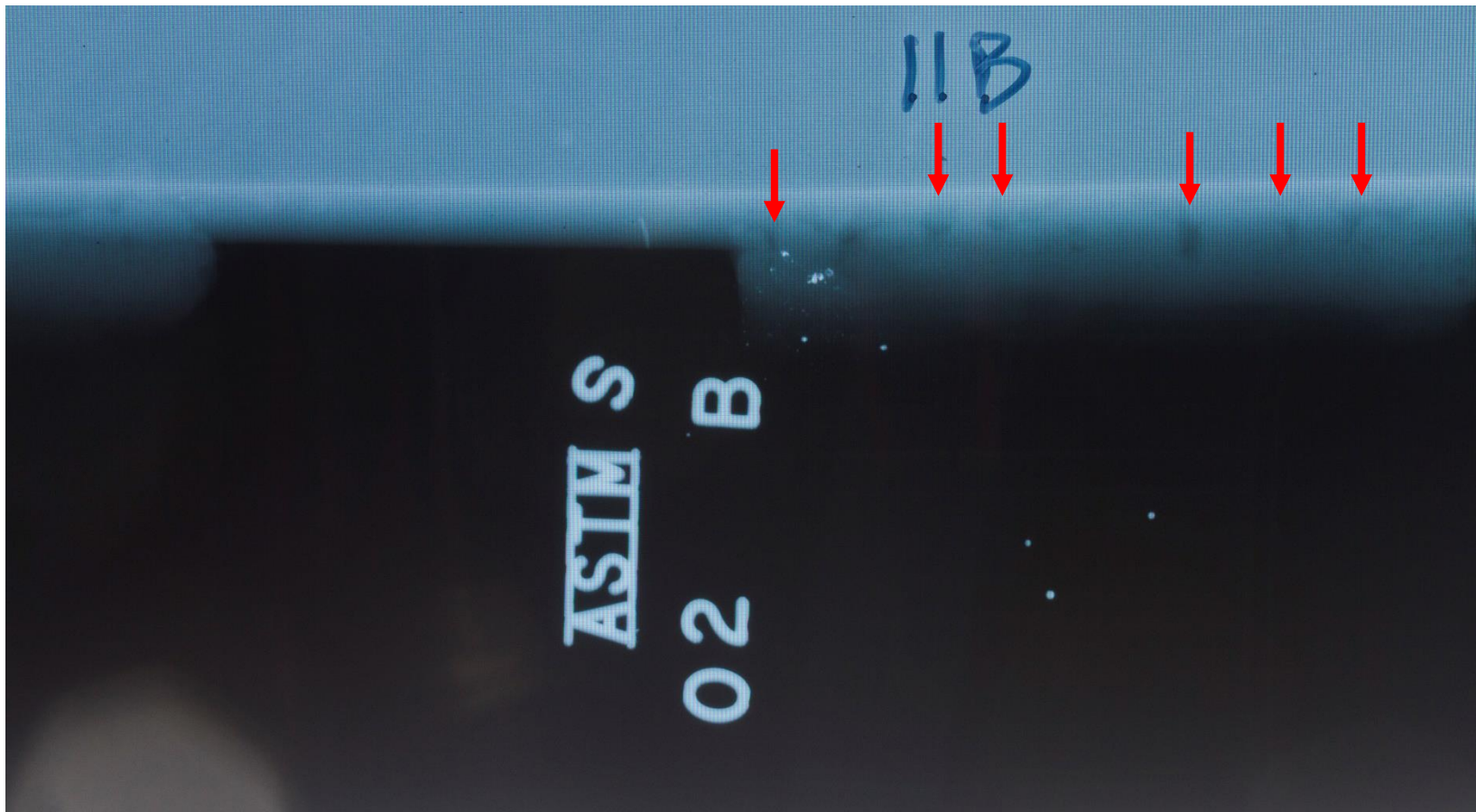


Fig. 13: South-West Corner of Bridge, Location 11B

- Arrows denote approximately six locations of large gas porosity in the stitch weld/.

Comment: *Weld Quality is unacceptable.*

Prepared for: City of Winnipeg

a)

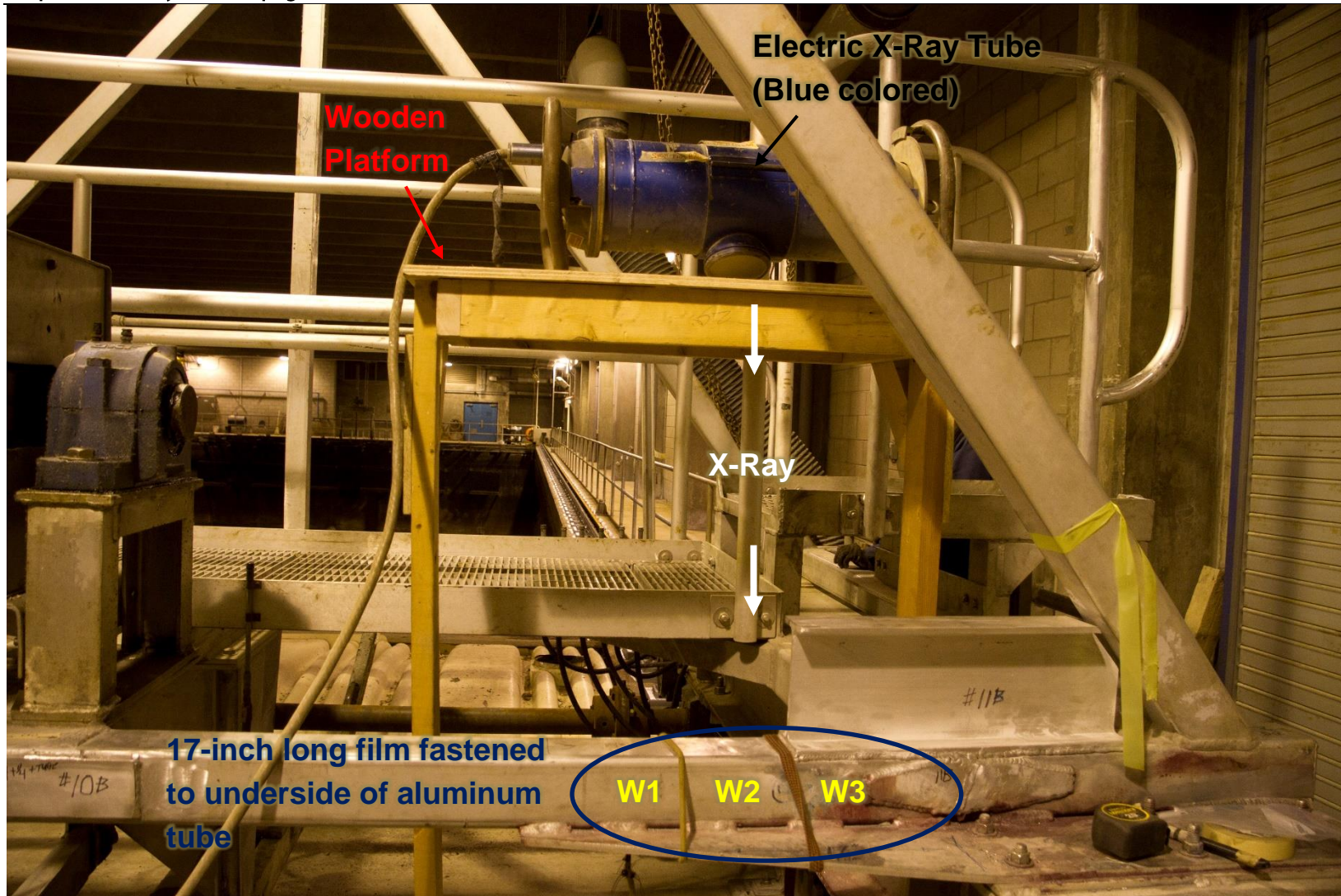


Fig. 14: Overall View of the Radiographic Set-Up at South-West Corner of Bridge – Location #11B

- Note position of electric x-ray tube on a wooden platform approximately 3-4 feet from the x-ray film location.

Note: *Stitch welds 'W1', 'W2' and 'W3' were being inspected.*

b)

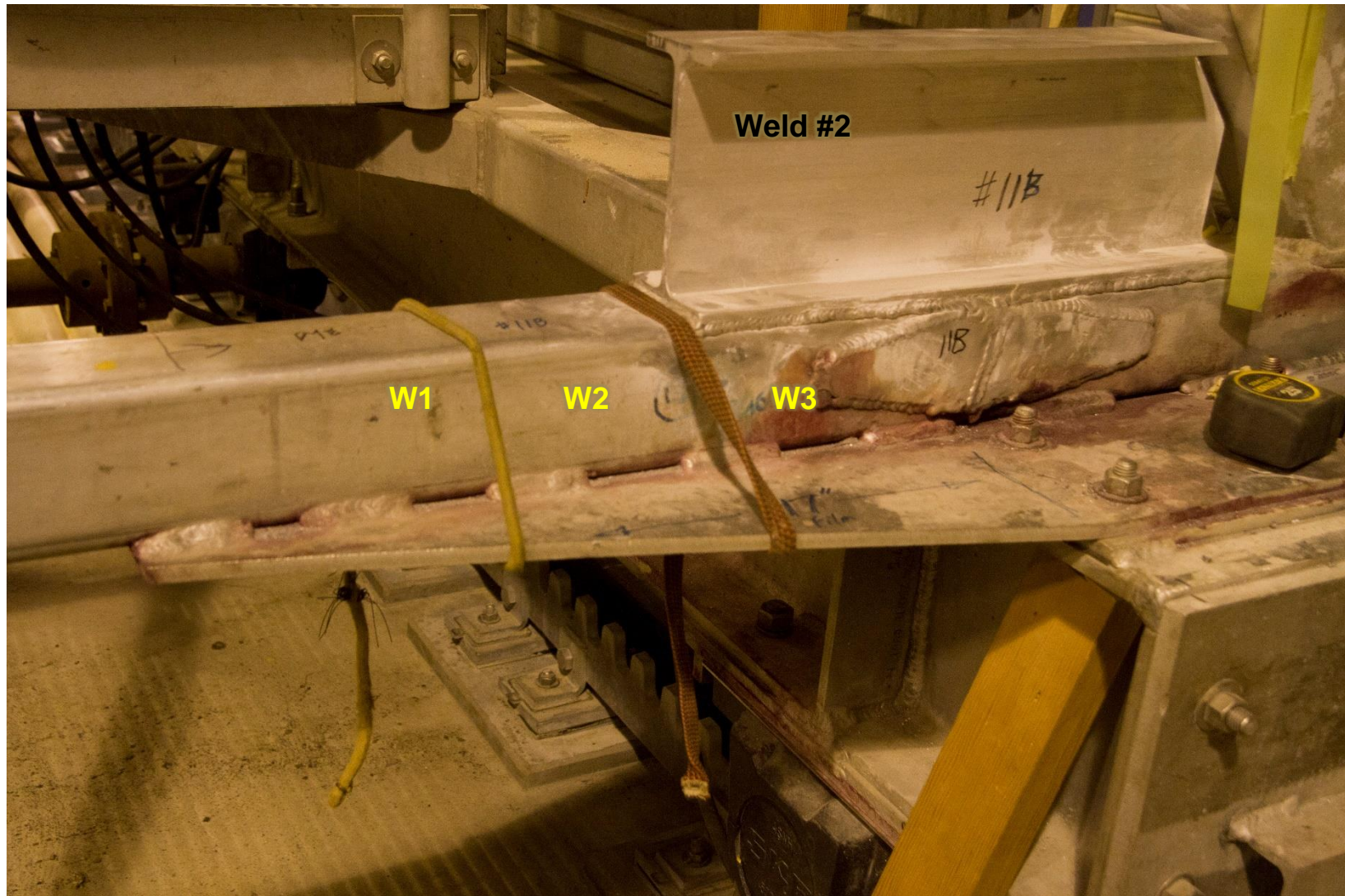


Fig. 14 (cont'd): Location #11B - Inspection of Stitch Welds 'W1', 'W2' and 'W3'

- A 17-inch long x-ray film was held underneath stitch or intermittent welds 'W1' to 'W3' with two bungee cords.

Prepared for: City of Winnipeg

c)



Fig. 14 (cont'd): Radiography at South-West Corner of Bridge

- View of x-ray technician setting the correct parameters for the x-ray shot.



Fig. 15: North-East Corner of Bridge, Rough welding at Location #2A

Note: A radiographic inspection of the weld was not possible at this location.

Appendix A

KGS Group Project No. 18-0107-007
Date February 5, 2020

**City of Winnipeg Water and Waste Department
South End Sewage Treatment Plant (SEWPCC) Primary Clarifier Travelling
Bridges**

Primary Clarifier No. 3 Truss Analysis and Crack Repair



CITY OF WINNIPEG WATER AND WASTE
DEPARTMENT

SOUTH END SEWAGE TREATMENT
PLANT (SEWPCC) PRIMARY CLARIFIER
TRAVELLING BRIDGES

Primary Clarifier No.3 Truss Analysis and
Crack Repair

Draft:
Rev. B

Date:
February 5, 2020

KGS Group Project:
18-0107-007

Client Project:
2030000515

KGS: 18-0107-007 | February 2020

PREPARED BY: **Ravi Chitikireddy, P.Eng.**
Structural Engineer

APPROVED BY: **Colin Siepman, P.Eng.**
Structural Department Head/Associate Principal



City of Winnipeg Water and Waste Department
SEWPCC Primary Clarifier Travelling Bridges / PC No.3 Truss Analysis and Crack Repair | Draft: Rev. B

KGS: 18-0107-007 | February 2020

TABLE OF CONTENTS

1.0 INTRODUCTION 5

2.0 OBSERVATIONS 6

2.1 Truss Geometry.....6

2.2 Load Estimate.....8

2.3 Maintenance History.....9

2.4 Non-Destructive Examination/Destructive Testing10

3.0 ANALYSIS 11

3.1 Finite Element Model.....11

3.2 Finite Element Analysis12

3.3 Fatigue Analysis.....17

3.4 Uncertainty of Analysis19

3.5 Factor of Safety19

4.0 REPAIR OPTIONS 20

4.1 Leave Temporary Repair As-Is.....20

4.2 Replace Damaged Section in Kind.....20

4.3 Replace Damaged Section and Reinforce20

4.4 Increase Truss Flexibility21

5.0 CONCLUSIONS AND RECOMMENDATIONS 22



City of Winnipeg Water and Waste Department
 SEWPCC Primary Clarifier Travelling Bridges / PC No.3 Truss Analysis and Crack Repair | Draft: Rev. B

KGS: 18-0107-007 | February 2020

List of Tables

Table 1: Estimated loads applied to truss structure	8
Table 2: Simulated maximum and minimum axial force and bending moments	12
Table 3: Calculated stress ranges and CSA S157 fatigue life.....	17

List of Figures

Figure 1: AJP Engineering model "Perspective View"	6
Figure 2: Layout of S-Frame model developed from truss geometry from AJP 3D Model.....	11
Figure 3: Graphic output from S-Frame for the scraper in the "Forward" position	14
Figure 4: Graphic output from S-Frame for the scraper in the "Return" position.....	15
Figure 5: Graphic output from S-Frame for the lateral friction force only ("forward" position).....	16
Figure 6: Figure 4 of Section 23 "Fatigue" of CSA S157-17 "Strength Design in Aluminum".	18

List of Appendices

Appendix A: Summary of Analysis



City of Winnipeg Water and Waste Department
 SEWPCC Primary Clarifier Travelling Bridges / PC No.3 Truss Analysis and Crack Repair | Draft: Rev. B

KGS: 18-0107-007 | February 2020

STATEMENT OF LIMITATIONS AND CONDITIONS

Limitations

This report has been prepared for City of Winnipeg Water and Waste Department (“the City”) in accordance with the agreement between KGS Group and the City (the “Agreement”). This report represents KGS Group’s professional judgment and exercising due care consistent with the preparation of similar reports. The information, data, recommendations and conclusions in this report are subject to the constraints and limitations in the Agreement and the qualifications in this report. This report must be read as a whole, and sections or parts should not be read out of context.

This report is based on information made available to KGS Group by the City. Unless stated otherwise, KGS Group has not verified the accuracy, completeness or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith. KGS Group shall not be responsible for conditions/issues it was not authorized or able to investigate or which were beyond the scope of its work. The information and conclusions provided in this report apply only as they existed at the time of KGS Group’s work.

Third Party Use of Report

Any use a third party makes of this report or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.



City of Winnipeg Water and Waste Department
SEWPCC Primary Clarifier Travelling Bridges / PC No.3 Truss Analysis and Crack Repair | Draft: Rev. B

1.0 INTRODUCTION

On October 21, 2019, a crack was reported by plant staff on the southwest corner of the support truss on the No. 3 Primary Clarifier Travelling Bridge. The crack resulted from the mechanical failure of an aluminum 4x4 HSS section. The damaged member is at the connection of the aluminum truss structure to the end-truck at that corner (referred to as location 11B).

The member remained connected to the end truck through a triangular gusset plate welded to the underside of the cracked bottom chord allowing the bridge to remain in operation. However, repair of the damaged truss was urgently needed. On November 20, 2019, the top fish plate was removed and a 503 mm (20") length of I-beam (152x84.6x5.8 – American Standard Profile) was welded to the top of the chord. The crack in the top of the HSS chord and the side fish plate was beveled to sound metal and re-welded.

A linear Finite Element Analysis (FEA) of the truss was performed using S-Frame software. The results of that analysis were used to calculate the stress and estimate fatigue life. The report describes how the FEA and fatigue calculation were undertaken and discusses the findings. Also included is a brief review of the Non-Destructive Examination (NDE) done on the joint, and a summary of the maintenance history of the truss.

Finally, the report evaluates the potential causes of failure in the bridge truss and considers recommended options for a long-term repair plan that will prevent the same failure from recurring.



Crack in primary clarifier No. 3 travelling bridge truss



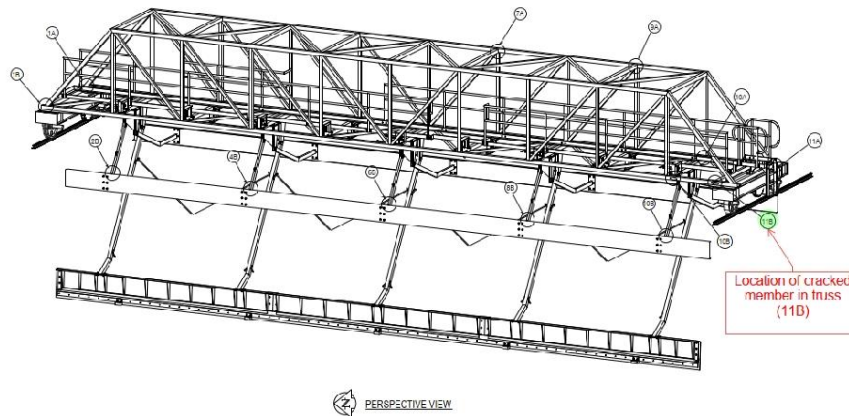
Emergency repair to crack – November 21, 2019

2.0 OBSERVATIONS

2.1 Truss Geometry

A 3D model of the Travelling Bridge including the end trucks, scraper, and skimmer assembly was provided to KGS Group by AJP Engineering via the City. During a site visit on January 7, 2020 the dimensions shown on the AJP model were verified by KGS Group with field measurements. The model was generally found to be dimensionally correct. During the same site visit, it was noted that the south side of the truss has an additional 4x4HSS cross-member for mounting the access ladder that is at the location of the failure.

FIGURE 1: AJP ENGINEERING MODEL “PERSPECTIVE VIEW”



The locations of the hoist motor-gearbox assembly and the drive motor-gearbox assembly were both checked. No new major equipment has been added that would potentially increase the load sustained by the truss. Finally, during the visit, a surface crack was observed on the welds near the outside corner of the truss near the location of the crack (11B). However, it was determined that the crack on the east side of the repaired member had been present since the repair in November 2019, and had not changed or grown since. During the site visit, a new surface crack was also observed in the stitch weld on the chord bottom gusset plate above the end truck at southwest corner.



Cracked fillet weld east side of HSS member at joint (11B)



Cracked fillet weld on the top of the chord gusset plate above the end truck (southwest corner)

2.2 Load Estimate

In order to estimate the loads sustained by the truss, two sources of information were compared. First, the mass of the assembly was generated by the 3D model. The size and material type of each member was entered into the program and the total mass was provided. Second, a marked-up copy of drawing L-39218 “Cross Sections of Primary Clarifier” Rev.2 was provided to KGS Group by Ovivo. The marked-up drawing provided loads for use in the deflection test performed on the truss after fabrication. By comparing the two, the validity of each was confirmed.

The drag created by the fluid force acting on the scraper blade is considered negligible due to the slow movement of the bridge. The friction force created by the UHMW wear pads on the scraper being dragged along the C100x11 steel floor rails was calculated to be 1,500 lbs based on an estimated interface friction coefficient of 0.3.

TABLE 1: ESTIMATED LOADS APPLIED TO TRUSS STRUCTURE

Name	Type	Location	Load kN (lbs)
Truss Weight	Static	Distributed	16.7 (3,750)
Hoist Assembly	Static	Distributed	14.2 (3,200)
Drive Assembly	Static	Distributed	17.4 (3,900)
Walkway	Static	Distributed	8.9 (2,000)
Hoist Motor & Gearbox Assy.	Static	Point 05A	8.9 (2,000)
Drive Motor & Gearbox Assy.	Static	Points 06B & 07B	5.8 (1,300)
Front Skimmer Assy.	Static	Distributed	3.3 (750)
Rear Skimmer Assy.	Static	Distributed	3.3 (750)
Scraper Assy. Gravity	Static (return cycle only)	Distributed	20.0 (4,500)
Scraper Assy. Friction	Static (forward cycle only)	Lateral - Distributed	6.7 (1,500)

The majority of the static loads do not change with the operation of the clarifier and cause a base level of stress in the truss. The scraper loads change depending on the position of the scraper blade when the travelling bridge is in forward/scraping mode or in a return cycle. When the scraper is resting on the clarifier floor, it is not supported by the truss. In this configuration, the scraper experiences friction. When the scraper

arm is in the elevated position the loads acting on the truss change. The scraper arm is no longer resting on the floor rails and extends farther out from the center of gravity of the assembly.

2.3 Maintenance History

In a review of the documents describing the maintenance history of the Travelling Bridge the following relevant entries were found:

- Empire Iron Works SEWPCC Primary Clarifier Expansion Operating and Maintenance Manuals:

January 1991 Primary Clarifier No.3 Travelling Bridge installed.

- September 16, 2004 Dorr-Oliver Field Service Report:

"Directly above [the Southwest Running Wheel] there is a very bad crack across the top and down both side of the aluminum tubing. This crack is opening and closing with the side to side jumping of the wheel. The cracking appears to be isolated to this area with no other evidence of cracking."

City of Winnipeg Asset/Function Detailed Work history SEWPCC PRIMARY Clarifier 3 bridge P311-BDM E 0009475 (Entry date: 21-Mar-05):

"02/23/05- Remove several covers off weir channel, put bridge in dry dock, help set up welder to repair crack in frame."

- November 24, 2015 Ovivo Field Service Report

"It is evident that the southwest corner of the bridge has had some prior repair. Structural members have been patch-welded in this area, and stitch welded at the joint. This southwest corner appears to be only location with patch welds. In the same southwest corner of the bridge, the brace plate (where the bridge structure bolts to the south truck) appears to be showing some deflection. In some other locations, it appears as if some welded joints have been re-welded, and that the brace plate welds in other corners of the bridge have been reinforced."

- December 11, 2017 CQI Project 1442, Report 1 (LPI + Visual Examination)

*"9. Location 10B – Fish plate weld quality is unacceptable
10. Location 11B – Crack in parent material penetrating from fish plate.
11. Location 11B – Lack of fusion on fish plate weld.
12. Location 11B – Cracked weld on lower horizontal tube."*

- January 17, 2018 AJP Engineering Structural Condition Assessment

"Field-Welded Plates:

The field-welded plates on the bottom chord along grid 'b' (Figure 5) should be removed and re-inspected to determine the reason that they were installed. Based on this information, an appropriate solution for reinforcement should be determined by a qualified professional engineer."

- August 2018, KGS Preliminary Design and Condition Assessment Report:

"The Primary Clarifier Bridge No. 3 is generally in good condition with only minor wear to structural members. Therefore, no material structural changes are recommended at this time. As part of the

construction scope of work, it is recommended, however, that all identified deficient weld locations as outlined by the AJP report are repaired by a qualified aluminum welder.”

- January 17, 2019 Bid Op. 682-2018 Site Meeting No. 6 Minutes:

“Weld repairs to bridge are completed. Inspection report will be issued shortly.”

Based on the above records, the crack noted in the Fall 2004 Dorr-Oliver report was originally repaired in Spring 2005. Because there are no relevant entries in the maintenance log since, that repair was the only repair made to that location until 2019.

Removal, inspection, and re-welding of the plate at location 10B was recommended in the AJP report, however, only minor repairs to surface cracks were done during the 2018/19 shutdown. In November 2019 the plate was removed and replaced with new. The welder reported grinding and welding a small crack before fillet welding a new plate ontop, however this was not independently verified.

2.4 Non-Destructive Examination/Destructive Testing

Part 1 in Drawing L-33105 is called “scraper bridge” and appears to refer to the welded aluminum truss that spans the clarifier. According to the drawing it is made of 6061-T6 aluminum. It is unlikely the frame has been substituted with a different material. 6061-T6 is also the most commonly used form of wrought aluminum in commercial applications. As such, it is assumed that the truss is composed of this material.

To date only Liquid Penetrant Inspection (LPI) and Visual Inspection (VI) has been used as the method of Non-Destructive Examination (NDE) for welds made on the truss. This is suitable for preliminary inspection work and generally to identify weld quality. However, LPI and VI are limited to the surface of the welded joint and often have not taken into account surface preparation, conditions, and technique employed before and during the weld.

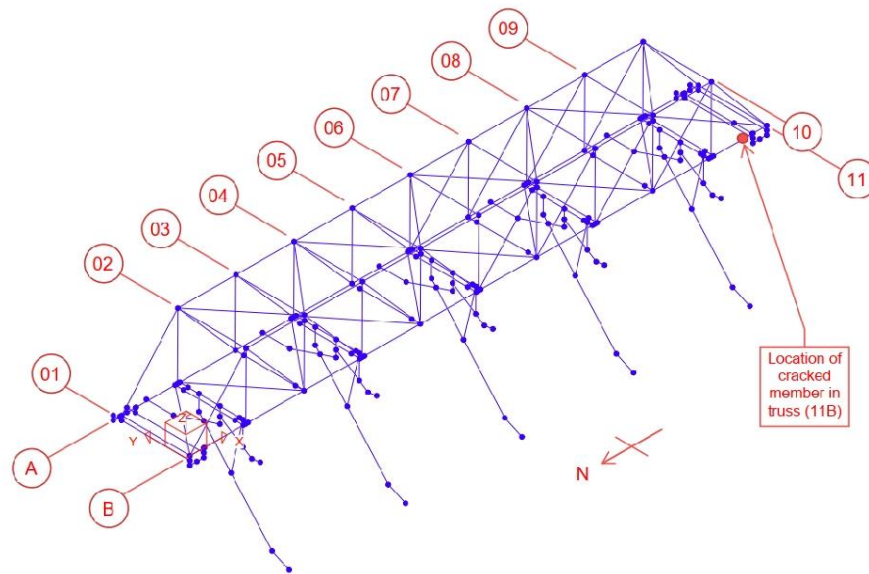
3.0 ANALYSIS

3.1 Finite Element Model

To complete the FEA, a Finite Element (FE) model was created based on the dimensions provided by the AJP Engineering 3D model described in Section 2.1. The FE model was created in S-Frame structural analysis software.

Because FEs used for this simulation are linear elements, some aspects of the truss and end-truck assembly were approximated. The stiffener plates that are welded to the bottom of the truss and bolted to the end-truck at the connection could not be modeled. Also, it was not possible to completely model the end truck assembly itself, so some minor approximations were made to allow for the difference in height of the wheel axle and the bottom of the truss.

FIGURE 2: LAYOUT OF S-FRAME MODEL DEVELOPED FROM TRUSS GEOMETRY FROM AJP 3D MODEL.



3.2 Finite Element Analysis

The forces and bending moments in each member were calculated using FEA and compared to the requirements of CSA S157-17 “Strength Design in Aluminum”. These values are estimates and based on combined loading of the truss assembly. Local stress maxima are not simulated directly in the model and were therefore, manually calculated based on the analysis results.

Two operating scenarios were considered in the FEA: The first with the scraper in the raised position (“Return” mode), and the second with the scraper in the lowered position (“Forward” mode). Based on the loads and geometry, the maximum and minimum axial forces and bending moments at each corner are summarized in Table 2.

From Table 2, Figure 3 and Figure 4, it can be seen that the location of maximum stress corresponds to the edge of the end truck at the southwest corner of the truss. Members in a truss structure are intended to be in tension only. In order to achieve this, the truss is typically supported by pin connections at each end. In this case, not only is the connection fixed, but also it has a rigid bearing surface along the width of the end truck. The result is that the chord is “bent” across the edge of the end-truck and a substantial moment is induced in what was likely designed to be a pure tension member. In addition, bottom chord B supports more weight than bottom chord A.

TABLE 2: SIMULATED MAXIMUM AND MINIMUM AXIAL FORCE AND BENDING MOMENTS.

Location	Load Type	“Return”	“Forward”
Northeast Corner (01A) Chord	Axial Force kN (lbs)	13.6 (3,060)	19.6 (4,410)
	Bending Moment kN.m (lb.ft)	2.32 (1,710)	2.54 (1,870)
Northwest Corner (01B) Chord	Axial Force kN (lbs)	26.2 (5,890)	14.5 (3,260)
	Bending Moment kN.m (lb.ft)	4.63 (3,420)	3.06 (2,260)
Southeast Corner (11A) Chord	Axial Force kN (lbs)	12.3 (2,770)	16.3 (3,660)
	Bending Moment kN.m (lb.ft)	2.08 (1,530)	2.77 (2,040)
Southwest Corner (11B) Chord	Axial Force kN (lbs)	26.8 (6,020)	17.2 (3,870)
	Bending Moment kN.m (lb.ft)	4.88 (3,600)	3.00 (2,210)
SW (11B) w/ Temp. Repair	Axial Force kN (lbs)	27 (6,070)	17.3 (3,890)
	Bending Moment kN.m (lb.ft)	4.4 (3,260)	2.46 (1,820)
Location 10B Chord	Axial Force kN (lbs)	26.8 (6,025)	17.6 (3,960)
	Bending Moment kN.m (lb.ft)	1.43 (1,050)	0.9 (660)
Chord to End Truck Weld (11B)	Axial Force kN (lbs)	28.3 (6.35)	15.9 (3.57)

KGS: 18-0107-007 | February 2020

ANALYSIS

When the lateral force on the scraper due to friction was accounted for, the effect on the truss was found to be less than 7% of the load that results from the lifting and lowering of the scraper arm. Bending moments on the “weak-axis” (around the y-axis of the section) were also reviewed and were not found to significantly contribute to the stress at each of the above connections.

FIGURE 3: GRAPHIC OUTPUT FROM S-FRAME FOR THE SCRAPER IN THE "FORWARD" POSITION

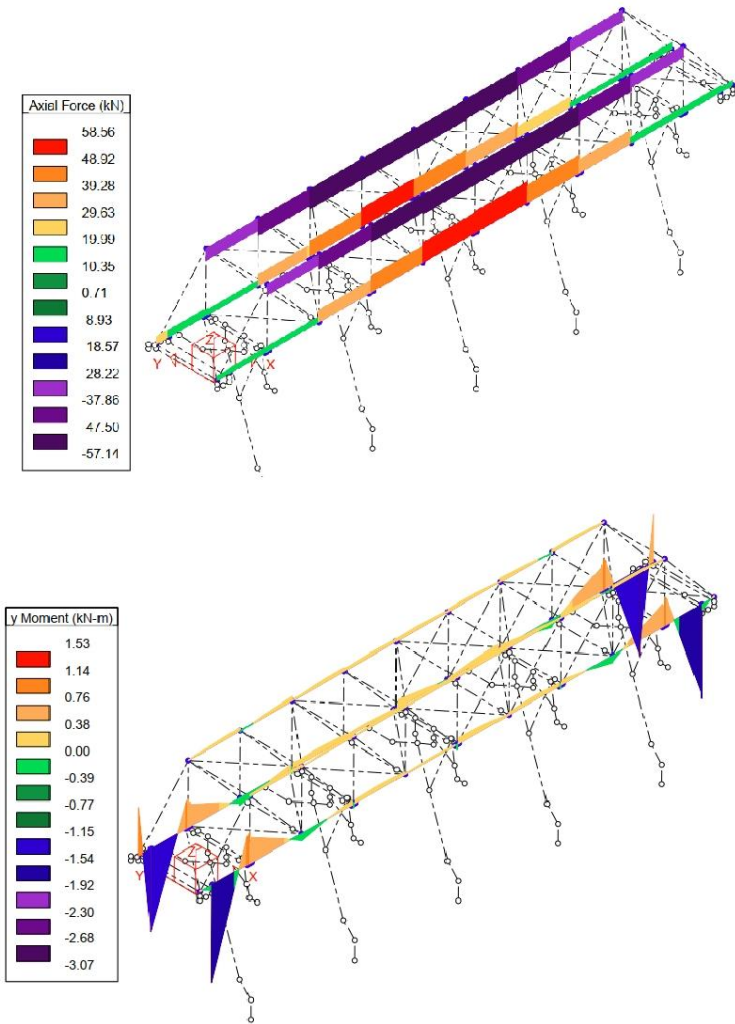


FIGURE 4: GRAPHIC OUTPUT FROM S-FRAME FOR THE SCRAPER IN THE "RETURN" POSITION

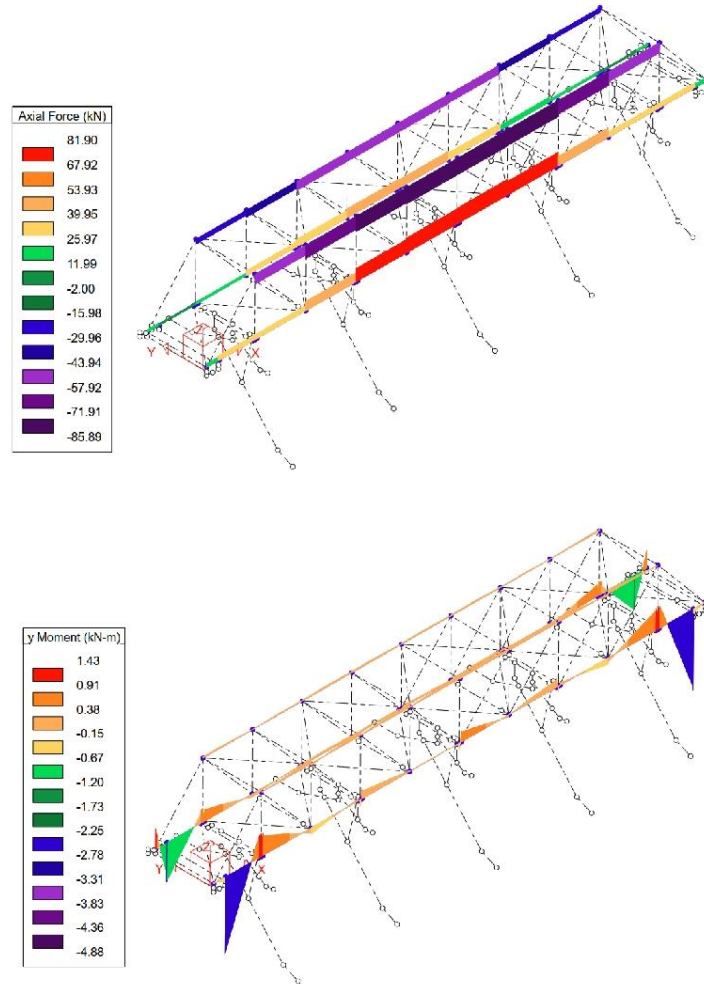
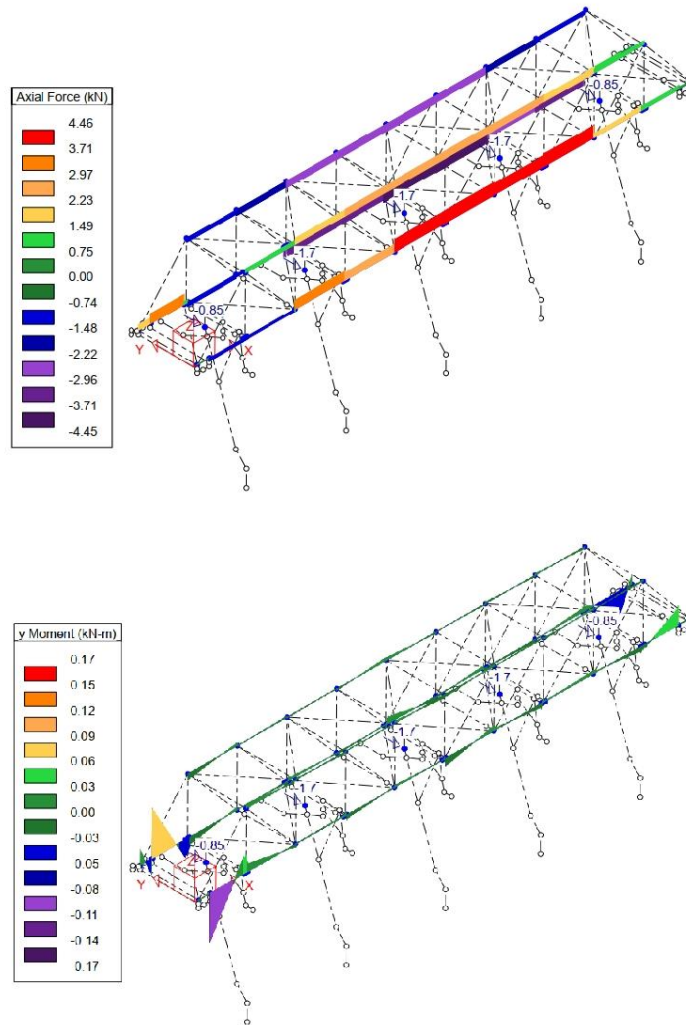


FIGURE 5: GRAPHIC OUTPUT FROM S-FRAME FOR THE LATERAL FRICTION FORCE ONLY ("FORWARD" POSITION)



3.3 Fatigue Analysis

The static loading from gravity creates a base stress value in the truss members. Variable loading results from the fluctuating stress due to operation of the bridge. So, it is only the variable loading from the two operating scenarios that results in fatigue action throughout the truss (i.e. the stress range).

The forces, and moments listed in Section 3.2 were used to calculate the maximum and minimum stress in the truss at the end-truck connection. Using the maximum and minimum stresses calculated for each, it was possible to compare them with the fatigue limits provided in Figure 4 of Section 23 “Fatigue” of CSA S157.

TABLE 3: CALCULATED STRESS RANGES AND CSA S157 FATIGUE LIFE.

Location	“Return” Stress MPa (ksi)	“Forward” Stress MPa (ksi)	Stress Range MPa (ksi)	Detail Category	Fatigue Life To Failure ¹	Fatigue Life (S.F. =3.0)
Northeast Corner (01A) Chord	40.3 (5.84)	46.2 (6.70)	5.9 (0.856)	A	N/A*	N/A*
Northwest Corner (01B) Chord	80.1 (11.6)	51.7 (7.50)	28.4 (4.12)	A	N/A*	N/A*
Southeast Corner (11A) Chord	36.2 (5.25)	48.2 (6.99)	12.0 (1.74)	E	6,000 yrs	2,000 yrs
Southwest Corner (11B) Chord	84.1 (12.2)	52.0 (7.54)	32.1 (4.65)	E	17 yrs	6 yrs
Southwest Corner (11B) with Temporary Repair	54.3 (7.9)	30.8 (4.5)	23.5 (3.4)	E	36 yrs	12 yrs
Location (10B) Chord	32.8 (4.76)	21.0 (3.04)	11.8 (1.71)	E	6,000 yrs	2,000 yrs
Chord to End Truck Weld (11B)	62.9 (9.13)	35.3 (5.12)	27.6 (4.01)	E	25 yrs	8 yrs

*CSA S157 Section 23 Figure 4 has no relevant fatigue cycle limit for the stress range and category specified.

(1) Fatigue life to failure estimates do not include a Factor of Safety

Assuming the Travelling bridge is operating at 45 mins per cycle and is running non-stop 24hrs per day, 365 days per year for 30 years, the total number of cycles to date is approximately 350,000 or 11,700 cycles per year. During a typical year, the bridge undergoes at least one shut down, and so the assumption that it is operating continuously 24 hours per day, 365 days per year is conservative.

Due to the additional 4x4 HSS cross member located on the South side of the bridge, the connection to the South West chord at location 11B is categorized as type “E” under the code. Therefore, based on the stresses observed, and the estimate of 11,700 cycles per year, the fatigue life to failure of the truss connection at the

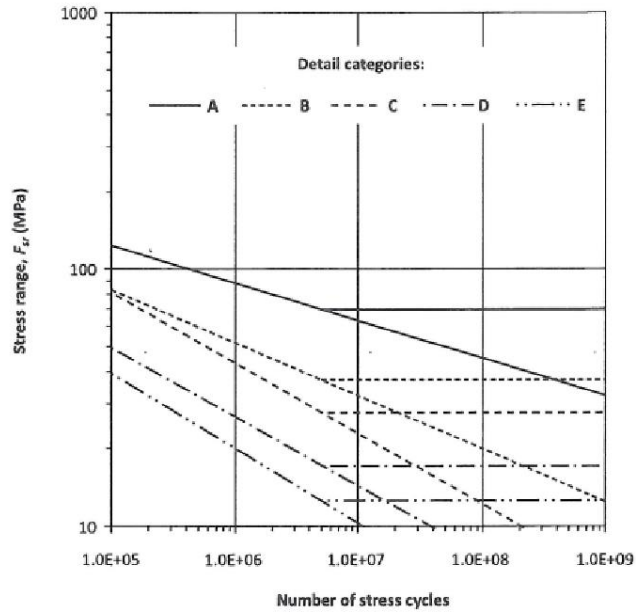
Southwest corner should theoretically be 17 years for a brand-new connection. For the same location but accounting for the added stiffness of the temporary repair the fatigue life to failure should be 36 years.

Location 10B is a Category E connection, therefore the expected lifespan is 7×10^7 cycles (over 6,000 years at 11,700 cycles per year). Theoretically, this is effectively unlimited fatigue life. It is unclear if the repair made to this location was due to a fatigue failure.

The maintenance record first observed the 11B crack in 2004, 13 years after the installation of the travelling bridge collector system. This amounts to approximately 152,000 cycles. The subsequent repair lasted another 14 years or 163,000 cycles. The summary of the stress and fatigue analysis can be found in Appendix A.

FIGURE 6: FIGURE 4 OF SECTION 23 "FATIGUE" OF CSA S157-17 "STRENGTH DESIGN IN ALUMINUM".

Figure 4
Fatigue stress ranges for design of aluminum components and connections
 (See Clauses 23.2.2, 23.2.3, 23.6.1, 23.6.2, and C23.2.)



Note: The above chart applies to all of the wrought aluminum products described by CSA S157. This includes 6061-T6 aluminum HSS structural tubing.

3.4 Uncertainty of Analysis

The chart from S157 can be used in reverse to estimate the stress range necessary to cause failure in the time frame that actually occurred. Using 13.5 years as the time period, the total number of cycles is approximately 1.58×10^5 . According to the figure, this translates to approximately 35 MPa, or an increase in stress of about 10% above the calculated value for location 11B. Also, because the chart relates the stress range to number of cycles on a logarithmic scale, the expected life of the bridge is very sensitive to an increase in stress.

The difference between the expected time until failure of 17 years and the actual time between the two failure events of 13.5 years can be explained by two sources of uncertainty: The first is from unknown events or changes that relate to the truss that affect its resistance to fatigue. This includes impacts, changes in run time (speed), internal weld defects and other unknowns. The second relates to the simplifications built into the FEA model that affect the intensity of stress range at that location. Assumptions such as linearization of each member, perfectly elastic behavior, rigidity of connection between the truss and end truck and the estimations done to define the loads fall into this category. Both of these together can be expected to account for approximately a $\pm 20\%$ variation in stress. Therefore, the variation observed is within the estimated uncertainty of the analysis.

3.5 Factor of Safety

In some materials, notably ferrous alloys, the Stress Range vs Number of Stress Cycles curve (S-N curve) eventually flattens out, so that below a certain endurance limit stress, failure does not occur no matter how long the loads are cycled. For these materials the structure can be sized to keep the cyclic stresses below the endurance limit stress by a suitable factor of safety. However, for some other materials such as aluminum, no endurance limit exists and therefore it must be arranged for the planned lifetime of the structure to be less than the failure point on the S – N curve by a safe margin.

The failure point on the S-N curve is comparable to an ultimate stress failure mode, for which a Factor of Safety of 2.5 is typically applied to structural members. However, due to the uncertainties previously noted in Section 3.4, a Factor of Safety of at least 3.0 is recommended for the SEWPCC bridge structure truss members.

4.0 REPAIR OPTIONS

Because the damaged member of the truss has failed and has been repaired twice, it is important to address the design flaw that has resulted in the failure correctly. In order to repair the joint, the pros and cons of the following options are considered:

4.1 Leave Temporary Repair As-Is

The temporary repair added stiffness to the damaged portion of the truss by increasing the moment of inertia at that location. This has reduced the stress at the cracked location, and therefore increased the number cycles the repaired member can sustain before failing again. Based on the structural analysis stress results and the chart (i.e. Figure 4) from CSA S157-17, the anticipated safe Remaining Useful Life (RUL) of the truss with the temporary repair is approximately 12 years.

Therefore, with the assumed loading and operating conditions, the truss temporary repair is acceptable for the short term. However, further repairs will be required in the near future if a life expectancy beyond 12 years is desired.

4.2 Replace Damaged Section in Kind

Replacing the cracked section of the bottom chord would involve removal of the temporary I-beam and cutting away a portion of the damaged 4x4 HSS chord that is spanning from grid line 10 to grid line 11 on the West side. This would require dry docking and temporary support of the bridge structure to ensure it remains in alignment during the repair process.

Replacing the damaged section would allow for the new member to restart the same fatigue cycling that the previous one experienced. Doing this would not correct the design flaw, however, and it would be assumed that the same failure would occur again after a similar amount of time. The anticipated safe Remaining Useful Life (RUL) of this option is only 6 years. Therefore, further repairs will be required in the near future if a life expectancy beyond 6 years is desired.

4.3 Replace Damaged Section and Reinforce

Replacing the damaged section of the bottom chord would involve removal of the temporary I-beam and cutting away a portion of the damaged 4x4 HSS that is spanning from grid line 10 to grid line 11 on the west side. It would also include the installation of a reinforcing member from gridline 10 to gridline 11. This would require dry docking and temporary support of the bridge structure to ensure it remains in alignment during the repair process.

Replacing the damaged section with the addition of reinforcement would allow for the new member to restart the fatigue cycling and should correct the design flaw. The anticipated safe Remaining Useful Life (RUL) of this option could likely be 25 years pending final design of the reinforcing details.

4.4 Increase Truss Flexibility

The bridge truss could be lifted above top the end-trucks with shims. This would reduce the bearing surface dramatically and eliminate the bending moment in the chord. Adjustments would have to be made to the bridge drive, scraper, and skimmer assemblies to account for the change in elevation. Also, the drive and hoist axles would have to be capable of accommodating the added flex in the truss. The drive axle has flexible couplings for this purpose, however, the hoist axle does not.

If the truss is lifted to allow for more flexibility, the following actions should also be taken to make sure that the drive axle can handle the distortion in the truss:

- The drive assembly should be carefully monitored in order to ensure that the additional bending in the truss does not result in additional friction or wear.
- The current draw by the drive motor should be measured before and after the repair.

This option would require dry docking and temporary support of the bridge structure but there may still be a risk of altering the overall alignment. A detailed mechanical and structural analysis would also have to be performed for the revised bridge truss configuration to verify that this option is feasible.

5.0 CONCLUSIONS AND RECOMMENDATIONS

With assistance of the model provided by AJP, a FE model of the truss and end-trucks was prepared. Using that model, the balance of forces and moments were calculated at each corner and the member stresses were calculated at each location. The FEA showed high stress ranges at the location of the crack in chord member 11B and also in the welds from the chord to the end truck at the corners of the bridge.

The remaining safe fatigue life was estimated to be less than 6 years for an equivalent un-modified beam. This generally means that the member was not originally designed to handle fluctuating bending moment stresses of that magnitude over time. The anticipated safe Remaining Useful Life (RUL) of the truss member with the temporary repair is approximately 12 years and the safe RUL of the recently repaired corner welds is roughly 8 years.

In order to address the original design flaws and extend the safe RUL of the truss to 25 years, it is recommended that the damaged locations be reinforced within 5 years. The only exception is the chord to end truck weld at the southwest corner, which was observed to be cracked during the January 7, 2020 site visit by KGS Group. The weld at this location should be repaired immediately, possibly including the addition of supplementary reinforcement such as a perpendicular stiffener plate. When performing these repairs, it may be prudent to upgrade the welds at the other three corners of the truss bridge since a contractor will already be mobilized on site.

Within the next 5 years the plate tack welded at location 10B should be removed and the area below re-inspected to verify the accounts of repairs previously made. The current plate does not provide significant reinforcement to the truss member so pending the results of the re-inspection it should be permanently removed and/or replaced with a larger continuously welded fish plate.

Additional general recommendations include:

- A more thorough investigation of critical welds for defects utilizing Ultrasonic or Radiographic Testing (UT or RT) since only surface inspections have been performed to date.
- Review of welder qualifications and procedures prior to all new welding.
- Quality control inspections by a certified weld inspector after all new welding.
- Regular inspections should be performed as part of the annual maintenance program in accordance with the SEWPCC Primary Clarifier Travelling Bridges Condition Assessment Methodology Technical Memorandum.

Although the FE analysis did not indicate other locations requiring repair to extend the safe RUL of the bridge truss to 25 years, due to the limitations and uncertainties of the analysis and investigations, additional deficiencies may become apparent during the annual inspection and maintenance program.

APPENDIX A

Summary of Analysis

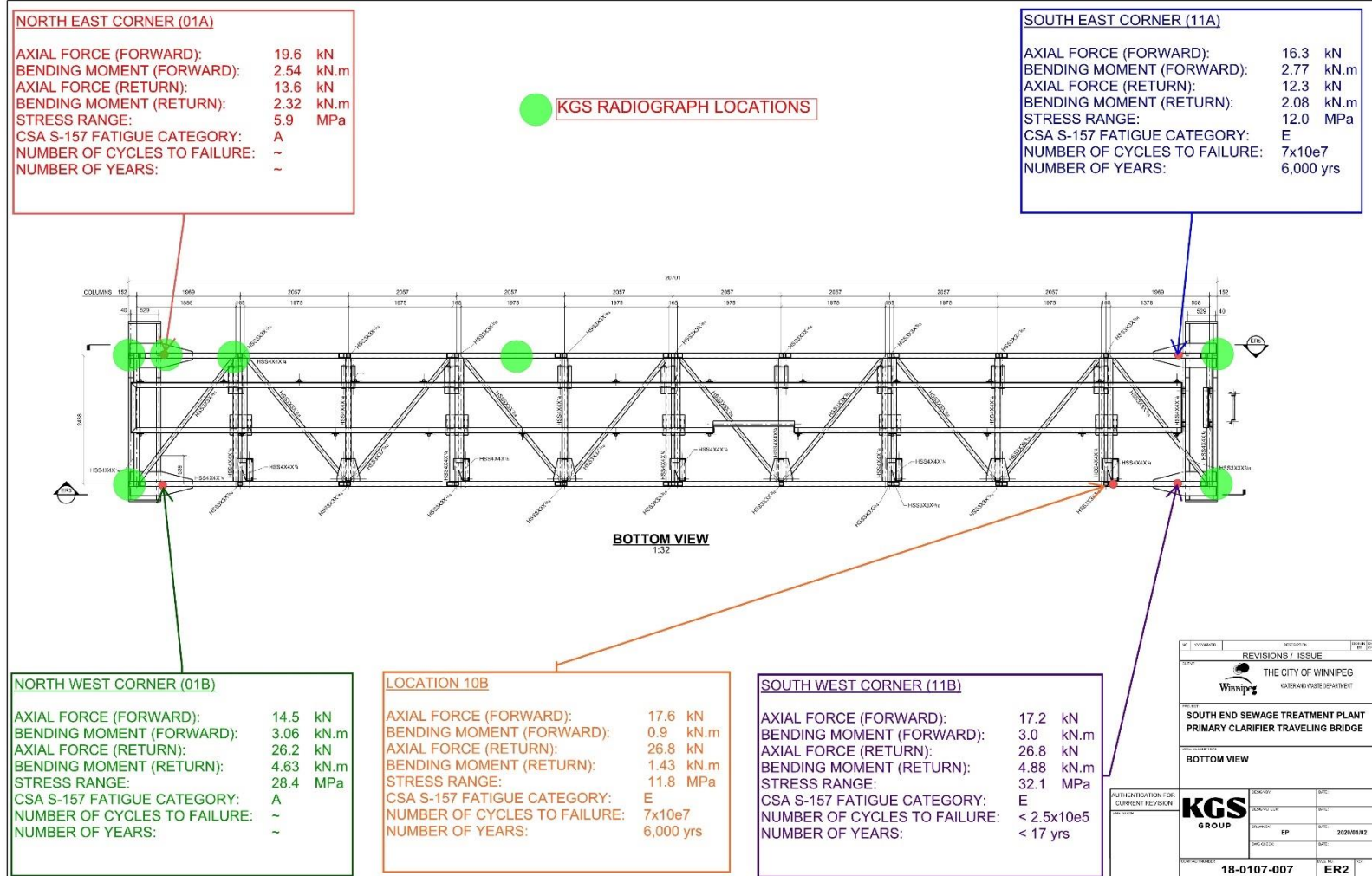
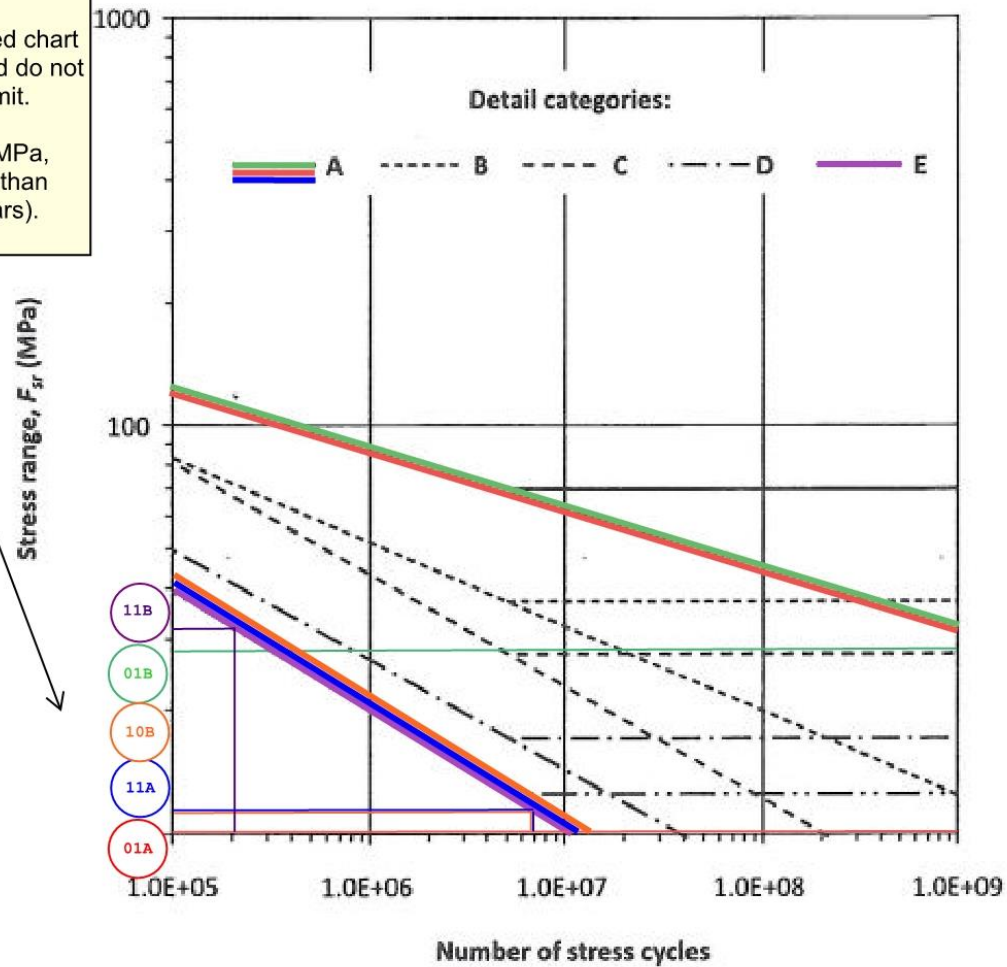


Figure 4
Fatigue stress ranges for design of aluminum components and connections
 (See Clauses 23.2.2, 23.2.3, 23.6.1, 23.6.2, and C23.2.)

01A, 01B, and 11A exceed chart values for Category A and do not have a relevant fatigue limit.

11B is category E, at 32 MPa, and so may sustain less than 2.5×10^5 cycles (<17 years).





Appendix B

**Platform Construction Require at the Ends of the Bridge to Ensure
Location of the Electronic X-Ray Tube for an Acceptable Radiograph Film**

DRAFT



Fig. B-1: View of 100lbs X-ray camera used for radiography of aluminum



Fig. B-2: X-ray technician using a Sawzall to cut the wooden platform to fit different locations at either end of the bridge. Wooden legs were disassembled and re-positioned to get the x-ray tube into the correct position for the x-ray “shot”



Fig. B-3: X-ray technician re-positioning the legs of the wooden platform to support the electric x-ray tube

APPENDIX J
QUALITY CONTROL CHECKLISTS

TRAVELING BRIDGE DRIVE AND WHEEL ALIGNMENT QC CHECKLIST

#	MEASUREMENT CRITERIA			MEASUREMENT RECORD				TOOL		
	Description	Range	Value	Source	Measurement	Units	Date & Time	Temp.	Make	Model

Flex-Rigid Coupling (Flex)

1	Combined angular and parallel misalignment of coupling/shaft centrelines	MAX	0.5° Angular	OEM							
---	--	-----	--------------	-----	--	--	--	--	--	--	--

Cogwheel / Cog Track

2	Contact height of pinon teeth on the rack pitch line		$\pm 1/32$ in	OEM							
3	Angular position of pinion teeth or "clocking" across the span of the clarifier (transverse)	Y/N	N/A	OEM							
4	Simultaneous contact of pinion teeth on both pinion gears with rack pitch line	Y/N	N/A	OEM							
5	Axle parallelism (plan view inclination of wheel) relative to opposite pinion gear	MAX	Slope = 0.005	ISO 12488-1							
6	Axle parallelism in elevation (wheel camber) relative to opposite pinion gear	MAX	Slope = 0.004	ISO 12488-1							

TRAVELING BRIDGE DRIVE AND WHEEL ALIGNMENT QC CHECKLIST

#	MEASUREMENT CRITERIA			MEASUREMENT RECORD				TOOL			
	Description	Range	Value	Source	Measurement	Units	Date & Time	Temp.	Make	Model	Calibration
Running Wheels											
7	Transverse elevation of wheel contact points on the rail/track		± 2mm	ISO 12488-1							
8	Elevation of wheel contact points on the rail/track measured along the length of the end trucks (longitudinal)		± 2mm	ISO 12488-1							
9	Transverse distance of centrelines of wheel contact area		± 3mm	ISO 12488-1							
10	Longitudinal distance between centrelines of wheel contact area		± 3mm	ISO 12488-1							
11	Transverse parallel offset distance between centre of contact areas on opposite wheels on rail/track		± 2.5mm	ISO 12488-1							
12	Axle parallelism (plan view inclination of wheel) relative to rail	MAX	Slope = 0.005	ISO 12488-1							

TRAVELING BRIDGE DRIVE AND WHEEL ALIGNMENT QC CHECKLIST											
#	MEASUREMENT CRITERIA			MEASUREMENT RECORD				TOOL			
	Description	Range	Value	Source	Measurement	Units	Date & Time	Temp.	Make	Model	Calibration
13	Axle parallelism in elevation (wheel camber) relative to rail	MAX	Slope = 0.004	ISO 12488-1							

TRAVELING BRIDGE DRIVE AND WHEEL ALIGNMENT QC CHECKLIST											
#	MEASUREMENT CRITERIA			MEASUREMENT RECORD				TOOL			
	Description	Range	Value	Source	Measurement	Units	Date & Time	Temp.	Make	Model	Calibration
13	Axle parallelism in elevation (wheel camber) relative to rail	MAX	Slope = 0.004	ISO 12488-1							

TRAVELING BRIDGE RAIL AND COG TRACK ALIGNMENT QC CHECKLIST

#	MEASUREMENT CRITERIA			MEASUREMENT RECORD				TOOL			
	Description	Range	Value	Source	Measurement	Units	Date & Time	Temp.	Make	Model	Calibration
5/8"x8-1/2" Hilti Anchor Bolts											
1	Overall parallelism (transverse) of anchor bolt centrelines on opposite sides of the clarifier	± 3mm		DWG 4S33416-1							
2	Rate of change of parallelism (transverse) of anchor bolt centrelines on opposite sides of the clarifier	MAX	Slope = 0.001	CISC Crane Steel							
3	Overall straightness (longitudinal) of individual anchor bolt centrelines	± 3mm		DWG 4S33416-1							
4	Rate of change of straightness (longitudinal) of individual anchor bolt centrelines	MAX	Slope = 0.001	CISC Crane Steel							
5	Transverse distance between centers of adjacent anchor bolts (same side of clarifier)	± 1.6mm		DWG 4S33416-1							

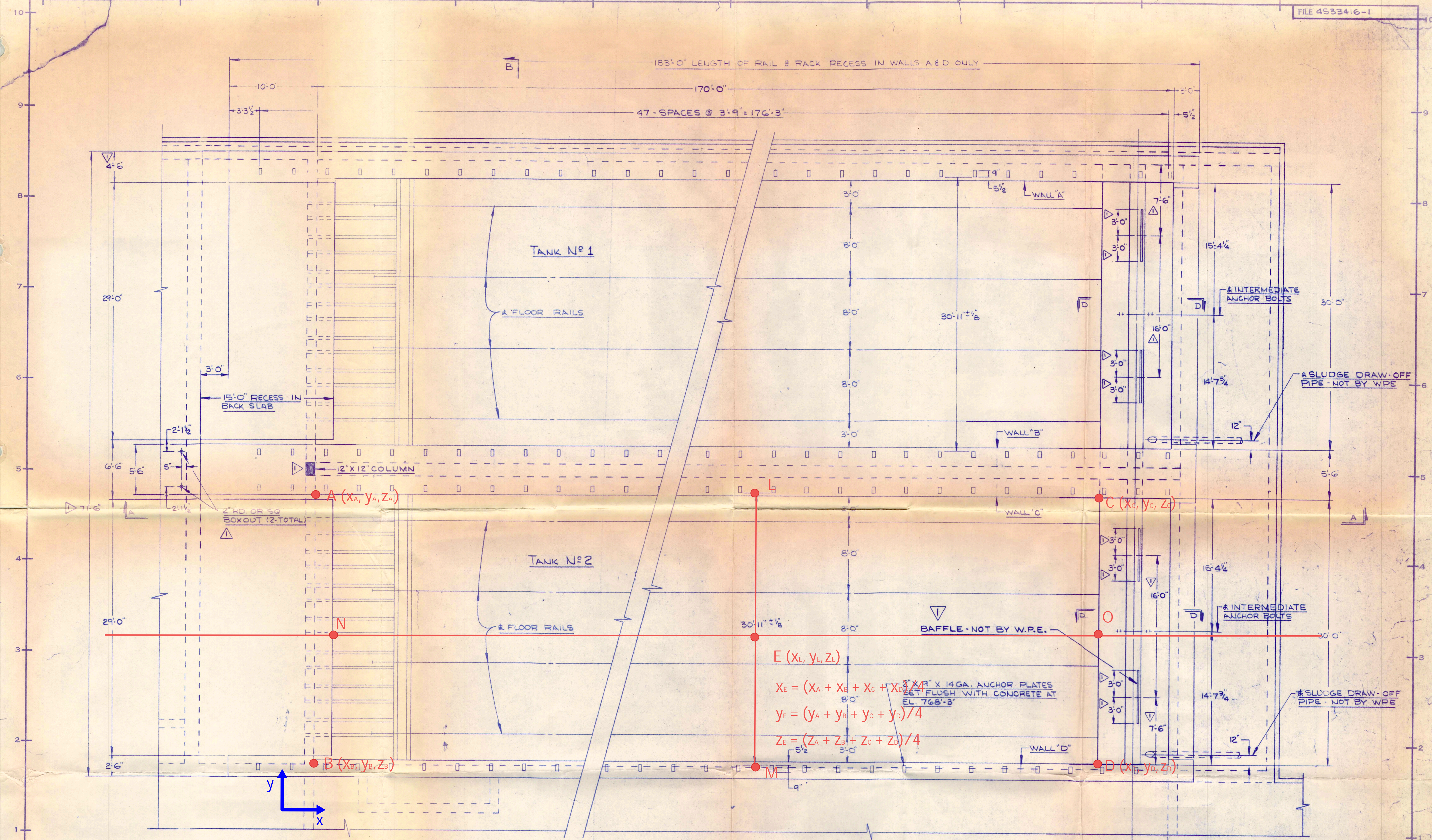
TRAVELING BRIDGE RAIL AND COG TRACK ALIGNMENT QC CHECKLIST

#	MEASUREMENT CRITERIA			MEASUREMENT RECORD				TOOL			
	Description	Range	Value	Source	Measurement	Units	Date & Time	Temp.	Make	Model	Calibration
ASCE 40AS Rail											
6	Overall longitudinal elevation change of top of individual rail/rack for	± 3mm		DWG 4S33416-1							
7	Rate of change of elevation change of top of individual rail/rack longitudinal	MAX	Slope = 0.001	CISC Crane Steel							
8	Overall transverse elevation change of top of rail/rack (rail to rail)	± 3mm		DWG 4S33416-1							
9	Rate of change of transverse elevation change of top of rail/rack (rail to rail)	MAX	Slope = 0.001	CISC Crane Steel							
10	Transverse distance between centroid of rail and rack cross sections (same side of clarifier)	± 1.6mm		DWG 4S33416-1							
11	Gap between rails at spliced rail joints	± 1.6mm		CMAA 70/74							

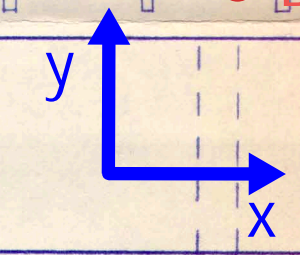
TRAVELING BRIDGE RAIL AND COG TRACK ALIGNMENT QC CHECKLIST

#	MEASUREMENT CRITERIA			MEASUREMENT RECORD				TOOL			
	Description	Range	Value	Source	Measurement	Units	Date & Time	Temp.	Make	Model	Calibration
3/4" MS Rack											
12	Overall longitudinal elevation change of top of individual rail/rack for	± 3mm		DWG 4S33416-1							
13	Rate of change of elevation change of top of individual rail/rack longitudinal	MAX	Slope = 0.001	CISC Crane Steel							
14	Overall transverse elevation change of top of rail/rack (rail to rail)	± 3mm		DWG 4S33416-1							
15	Rate of change of transverse elevation change of top of rail/rack (rail to rail)	MAX	Slope = 0.001	CISC Crane Steel							
16	Transverse distance between centroid of rail and rack cross sections (same side of clarifier)	± 1.6mm		DWG 4S33416-1							

APPENDIX K
SAMPLE DOCUMENTS



PLAN VIEW



$$X_E = (X_A + X_B + X_C + X_D) / 4$$

$$Y_E = (Y_A + Y_B + Y_C + Y_D) / 4$$

$$Z_E = (Z_A + Z_B + Z_C + Z_D) / 4$$

3" x 1" x 14 GA. ANCHOR PLATES SET FLUSH WITH CONCRETE AT EL. 768'-3"

* BUOYANT HELI THICKENER FOR ANCHORAGE BELOW EL. 763'-9" SEE 4S33417

SHEET 1 OF 2

SUBSTITUTION OF CINCH ANCHORS, EXPANSIONS SHIELDS, STUDS SET WITH A 'STUD DRIVER' OR THE LIKE, IN PLACE OF ANCHOR BOLTS PROVIDED BY WALKER PROCESS EQUIPMENT WHICH ARE INTENDED TO BE FLOURED IN THE CONCRETE, WILL BE DONE AT THE CONTRACTOR'S RISK.

ADD 12' X 12' COLUMN, RELOCATED		
2-2" SQ. OR RD. BOXOUT, REVISED		
BAFFLE AND ADDED NEW DIMS.		
LOCATING BAFFLES	CR	1/28/72
NO.	REVISIONS	DATE

THIS DRAWING IS THE PROPERTY OF WALKER PROCESS EQUIPMENT AND IS TO BE USED ONLY IN CONNECTION WITH THE PERFORMANCE OF WORK BY WALKER PROCESS EQUIPMENT. REPRODUCTION IN WHOLE OR IN PART FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

	DATE	BY
DRAWN	9-22-71	CR
CHECKED	7-27-71	CR
APPR.		
SCALE	3/16" = 1'-0"	

WALKER PROCESS EQUIPMENT	
DIVISION OF CHICAGO BRIDGE & IRON CO.	
AURORA, ILL., U.S.A.	
FOUNDATION LAYOUT	
COG BRIDGE	
WINNIPEG, MANITOBA	
CONTRACT	71-W352W 71-W353W
FILE	4S33416-1

