Part 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises general construction for the rehabilitation of the West Low Level Outlet at Highfield Dam, located east of Swift Current, Saskatchewan. The site of the Work of this Contract is NW ¼ Section 36, Township15, Range 11, West of the 3rd Meridian (NW 36-15-11-W3M).

.2 The Work includes the supply (unless noted otherwise) and installation of all materials required to rehabilitate the outlet structure including the following:

- .1 Supply of 1.37 m diameter HDPE pipe and fittings.
- .2 Underwater (using divers) slip lining of existing upstream concrete conduit with HDPE pipe and grouting in place. The intent is that Work of the upstream conduit be completed and watertight so that Work in the gatewell and downstream conduit can be completed in the dry.
- .3 Slip lining of existing downstream concrete conduit with HDPE pipe and grouting/concreting in place.
- .4 Supply, installation and commissioning of fabricated stainless steel sluice gate and manual hoist in the gatewell.
- .5 Demolition and disposal of gatewell components; top of the gatewell including concrete corbel, sluice gate and hoist, steel hatch, ladder, grab bar and stop log guides.
- .6 Construction of a new concrete operating deck at the top of the gatewell.
- .7 Supply and installation of new gatewell hatch, removable panels, vent pipe extension and gatewell ladder.
- .8 Supply and installation of chain link fencing and gates at the operating deck and outlet basin.
- .9 Canal rehabilitation for 50 m length. Includes clean out of existing armour, excavation/trimming of bed and side slopes, wasting of canal excavations, supply and installation of granular materials and rock rip rap, topsoil stripping and replacement in Waste Fill areas, seeding of waste fill areas.
- .10 Installation of Department supplied rock rip rap in the reservoir around the gatewell.

1.2 CONTRACT METHOD

.1 Construct Work under combined lump sum and unit price contract.

1.3 WORK SEQUENCE

.1 Construct Work in stages to accommodate continued use of premises during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with Departmental Representative Occupancy during construction.

.3 Required stages:

- .1 Complete the underwater construction work in the upstream conduit by November 15, 2014.
- .2 Attain Substantial Completion by March 31, 2015.

1.4 CONTRACTOR USE OF PREMISES

.1 Limit use of premises for Work, for storage, and for access, to allow:

- .1 Partial Departmental occupancy during operation and maintenance of the reservoir and canal.

.2 Co-ordinate use of premises under direction of Departmental Representative.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.6 At completion of construction condition of existing work: equal to or better than that which existed before new work started.

1.5 DEPARTMENTAL OCCUPANCY

.1 Department may occupy site during construction period for execution of reservoir and canal operations. Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Departmental usage.

1.6 DEPARTMENTAL FURNISHED ITEMS

.1 Department Responsibilities:
- .1 Supply of a limited quantity of rock riprap for placement on the upstream dam slope around the gatewell.

1.7 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.
- .5 List of Outstanding Shop Drawings.
- .6 Change Orders.
- .7 Other Modifications to Contract.
- .8 Field Test Reports.
- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

.1 General Conditions

1.2 CASH ALLOWANCES – NOT USED

1.3 ADDITIONAL WORK AND MATERIALS

.1 Expenditures under additional work and materials will be authorized in accordance with procedures provided in General Conditions GC6.4 – Determination of Price.

Part 2 PRODUCTS – NOT USED

Part 3 EXECUTION – NOT USED

END OF SECTION

Part 1 GENERAL

1.1 MEASUREMENT SYSTEM

.1 This section specifies the measurement rules that will generally be used for payment purposes unless otherwise specified in the Contract Documents. In case of conflict between the method of measurement specified in this section and the requirements specified in Section 01 28 00 – Measurement Schedule, the latter will govern.

.2 This section specifies the International System of Units (SI) in accordance with CAN/CSA–Z234.1–89 Canadian Metric Practice Guide.

.3 When used in the Contract, the following abbreviations and symbols have the meaning assigned to them.

Abbreviation/Symbol	Meaning
µm	micrometre or micron
mm	millimetre
m	metre
mm^2 or mm2	square millimetre
m^2 or m2	square metre
ha	hectare
kPa	kilopascal
MPa	megapascal
m^3 or m3	cubic metre
l (or where clarity is needed L)	litre
L.S.	lump sum
g	gram
kg	kilogram
N	newton
kN	kilonewton
t	tonne
no.	number (quantity)
min	minute (time)
h	hour
d	day
wk	week
%	percent
>	greater than
≥	greater than or equal to
<	less than
≤	less than or equal to
$	Canadian dollars
°	degree (angle)
°C	degree Celsius

1.2 METHOD OF MEASUREMENT

.1 Unless otherwise indicated in the Contract Documents:

.1 Earthwork materials will be measured net in place after compaction, with no allowance for bulking, shrinkage, compression, foundation settlement, or waste;

.2 Products will be measured net, with no allowance for waste;

.3 Dimensions used in calculating quantities will be rounded to the nearest unit of dimension as follows:

Quantity	**Dimension**
Volume	centimetre
Area	decimetre
Length	centimetre

.4 Contours may be based on aerial photograph interpretation and are approximate only. Actual ground elevations and location co-ordinates will be determined in the field during the course of the Work for measurement purposes; and

.5 Measurements and payment will not be made for work carried out beyond measurement and payment lines and limits specified in the Contract Documents.

.2 When boundaries between different items of Work are not specified in the Contract Documents, such boundaries will be established by the Departmental Representative.

.3 Mass:

.1 Mass will be measured by weigh scale or by estimated or theoretical mass taken from reference documents, as specified.

.2 Mass will be measured to 3 decimal places.

.3 Prepare detailed and summary haul records for material paid by mass as work progresses and submit daily to the Departmental Representative.

.4 Length:

.1 Length will be measured at the item centreline or mean chord.

.2 Items to be measured by linear dimension will be measured parallel to the base or foundation upon which such items are placed.

.3 Items to be measured by station will be measured horizontal to the base or foundation upon which such items are placed.

.4 Centre line for pipes, ducts, culverts, and similar items will be the line equidistant between inside faces of pipe walls.

.5 Area:

.1 For rectangular and regular shaped objects, area will be measured using mean length and width or radius.

.2 For irregular objects, area will be measured by the sum of squares, triangles, and circles, etc., as selected by the Departmental Representative.

.6 Volumes:

.1 Unless otherwise indicated, volume will be measured using mean length, width, and height or thickness.

.2 Excavation and fill volumes will be computed using survey data input to software program.

.7 Number of items will be measured on a per item basis.

.8 Lump Sum items will not be measured for payment.

.9 When standard manufactured items are identified by their physical characteristics, such characteristics will be considered as nominal. Unless more stringently controlled by specified tolerances, manufacturing tolerances established by the industry involved will be accepted.

1.3 MEASUREMENT COMPUTATION

.1 Formulae and computer programs used for measurement computation will be as specified or, when not specified, as selected by the Departmental Representative.

1.4 MEASUREMENT OF WORK

.1 Unless otherwise specified, the Departmental Representative will measure the Work for the purpose of determining payment to the Contractor.

.2 The Departmental Representative will request the Contractor to attend with the Departmental Representative in making measurements.

.3 If the Contractor does not attend pursuant to clause 1.4.2, measurements made or approved by the Departmental Representative will be considered to be the correct measurement for such part of the Work.

.4 The Departmental Representative will prepare survey records and drawings for payment purposes as the Work progresses. The Departmental Representative will request the Contractor to attend, within 14 days, to examine and verify such records and drawings. If the Contractor does not attend to examine and verify such records and drawings, they will be considered to be correct.

.5 If, after attending pursuant to clause 1.4.2 or 1.4.4, the Contractor disagrees with such measurements or records or drawings, they will nevertheless be considered correct until the Contractor notifies the Departmental Representative of the aspects in which they are considered incorrect. On receipt of such notice, the Departmental Representative will review the measurements or records or drawings and either confirm or vary them.

1.5 QUANTITIES

.1 Unless otherwise indicated, quantities specified in Bid and Acceptance Form - Appendix 1 Combined Price Form for Unit Price Work are estimated quantities and will not be considered as actual quantities of Work to be performed. Subject to the Contract terms, unit prices stated in the Bid and Acceptance Form - Appendix 1 Combined Price Form

will be applied to actual quantities of Work performed as measured in accordance with the Contract Documents.

1.6 SCALES

.1 Unless otherwise indicated, provide weigh scales, certified by Industry Canada, for measurement purposes.

.2 Provide scales that are accurate to within 0.5% of correct mass throughout the range of use. Spring balances will not be permitted.

.3 Prior to use and at anytime requested by the Departmental Representative, provide the services of a qualified independent person, acceptable to the Departmental Representative, for the testing and servicing of weigh scales. Perform baseline tests and record results. Service and adjust weigh scales to meet requirements of Industry Canada and the Contract Documents. Submit a final report of weigh scale tests, services, and adjustments.

.4 Scales indicating more than true mass will not be permitted to operate and material measured subsequent to the last previous correct accuracy test will be reduced by the percentage of error in excess of 0.5%.

.5 Scales indicating less than true mass will be adjusted and no additional payment will be made for materials previously scaled and recorded.

1.7 BID AND ACCEPTANCE FORM - APPENDIX 1 COMBINED PRICE FORM

.1 Bid and Acceptance Form - Appendix 1 Combined Price Form is divided into items for purposes of measurement and payment of Work. Price each item in accordance with the methods of measurement specified in the Contract.

.2 Item names in Bid and Acceptance Form - Appendix 1 Combined Price Form identify the work covered by the respective item, but do not define the size or nature of the unit.

.3 Read item names in Bid and Acceptance Form - Appendix 1 Combined Price Form as part of the item scope, measurement, and payment requirements to which they apply in the Measurement Schedule.

.4 For each price specified in Bid and Acceptance Form - Appendix 1 Combined Price Form include all costs and charges required to perform the Work including overhead charges and profit, and all costs of all related Work for which payment is not specified elsewhere.

.5 Subject to the provisions of the Contract Documents, the total amount of Bid and Acceptance Form - Appendix 1 Combined Price Form shall cover all of the Contractor’s obligations under the Contract and all matters and things necessary for performance of the Work in accordance with the Contract Documents.

.6 Payments will be made only for items specified in Bid and Acceptance Form - Appendix 1 Combined Price Form. Costs and charges not directly provided for in the Schedule of Prices will be deemed to be included therein.

.7 Works or material included in any one item will not also be measured for payment under another item. No item will be paid for more than once.

.8 Omissions or errors in any item including quantities in Bid and Acceptance Form - Appendix 1 Combined Price Form will not invalidate the Contract nor release the Contractor from any of his obligations or liabilities under the Contract.

1.8 LUMP SUM ITEMS

.1 Breakdown of Lump Sum Items

.1 Submit a breakdown of each Lump Sum item included in Bid and Acceptance Form - Appendix 1 Combined Price Form, to the Departmental Representative within 21 days from the date of notification of acceptance of the offer.

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.2 Provide sufficient details as may be required by the Departmental Representative to identify the principal components of the Work and to permit ready valuation of Work performed.

Part 2 PRODUCTS – NOT USED

Part 3 EXECUTION – NOT USED

END OF SECTION

Part 1 GENERAL

1.1 MEASUREMENT SCHEDULE

.1 Schedule: See next page.

Part 2 PRODUCTS – NOT USED

Part 3 EXECUTION – NOT USED

ITEM NO.	ITEM NAME	SECTION	SCOPE AND MEASUREMENT
1.	Mobilization and Demobilization	Division 1	1. Scope: Includes supplying to the Site of all labour, equipment, products and incidentals; maintaining existing and providing temporary roads and facilities including buildings, utilities, and other construction necessary for the Contractor's methods during performance of the Contract and which does not remain as part of the Permanent Work; removing and transporting from the Site, all labour, equipment, products, and other items not required to remain upon Total Performance of the Work; cleaning of the Site; and all related work and materials for which payment is not included elsewhere.
2.	Care of Water	33 22 40	1. Scope: Includes designing, supplying, installing, constructing, operating, maintaining, and removing care of water provisions, and all related work and materials for which payment is not included elsewhere.
3.	Demolition	02 41 99	1. Scope: Demolition, removal and disposal of top of gatewell concrete including the corbel, existing slide gate, hoist, and gatewell hatch, ladder and stop log guides.
4.	HDPE Piping	33 11 16	1. Scope: Supplying, shipping to site and fusing of HDPE pipe and associated fittings, and all related work and materials for which payment is not included elsewhere.
5.	Conduit Rehabilitation - Sliplining	35 53 33	1. Scope: Slip lining of the conduit including underwater construction, cleaning and preparation of the existing conduit and outlet basin, insertion of the HDPE pipe, dewatering, installation and removal of temporary formwork or bulkheads, underwater concreting, low pressure lightweight cellular concrete grouting, environmental protection measures during construction, reinforced cast-in-place concrete and mass concrete in the outlet basin, removal of the upstream underwater blind flange at the commissioning stage, and all related work and materials for which payment is not included elsewhere.
6.	Chain Link Fencing	32 31 13	1. Scope: Supply and installation of chain link fencing at the outlet basin and gatewell operating deck, and all related work and materials for which payment is not included elsewhere.

7.	Gate and Hoist	40 05 59.23	1. Scope: Supply, installation and commissioning of slide gate, mounting plate and manual hoist and all related work and materials for which payment is not included elsewhere.
8.	Gatewell Rehabilitation	02 41 99 03 30 00.01 07 72 33	1. Scope: Construction of cast-in-place concrete operating deck, supply and installation of hatches and ladder, and all related work and materials for which payment is not included elsewhere.
9.	Excavation-Canal	31 23 16	1. Scope: Topsoil stripping of designated waste area adjacent to canal banks and stockpiling, excavation, shaping, trimming and cleaning of canal bed and side slopes to receive bedding gravel and riprap, dozing, loading, hauling and dumping in designated waste areas adjacent to the canal, spreading and grading of waste areas, placing stockpiled topsoil on waste areas, finish grading of waste areas, and all related work and materials for which payment is not included elsewhere. 2. Measurement: Canal Excavation and wasting: The excavated volume between the existing surface and the excavation lines, grades and elevations specified in the Contract documents or as adjusted by the Departmental Representative. Topsoil stripping and replacement: The excavated volume between the existing surface and the excavation lines, grades and elevations specified in the Contract documents or as adjusted by the Departmental Representative.
10.	Granular Materials and Riprap	31 37 01	1. Scope: Supplying, loading, hauling, temporary stockpiling, placing, spreading, compacting, blading, and trimming of granular materials and riprap in the canal, and all related work and materials for which payment is not included elsewhere. 2. Measurement: The volumes between the excavated surface and the lines, grades and elevations specified in the Contract documents or as adjusted by the Departmental Representative.

11.	Reservoir Riprap	31 37 01	1. Scope: Cleaning by use of a Grizzly and loading Department supplied Riprap, hauling, temporary stockpiling, and placing in the reservoir around the gatewell, and all related work and materials for which payment is not included elsewhere. 2. Measurement: The volume hauled from the stockpile and placed in the reservoir as measured by survey or other measurement means as determined by the Departmental Representative.
12.	Seeding of Waste Areas	32 92 19.13	1. Scope: Loading Departmental Representative supplied Riprap, hauling, temporary stockpiling, and placing in the reservoir around the gatewell, and all related work and materials for which payment is not included elsewhere. 2. Measurement: The area seeded as measured by survey or other measurement means as determined by the Departmental Representative.

END OF SECTION

Part 1 GENERAL

1.1 ADMINISTRATIVE RESPONSIBILITIES

.1 The Departmental Representative will be responsible for the administrative requirements for the Preconstruction and Progress meetings.

.2 The Contractor shall be responsible for administrative requirements for Workplace Orientation and Safety meetings.

1.2 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting 7 days in advance of meeting date.

.4 Preside at meetings.

.5 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.6 Reproduce and distribute copies of minutes within 7 days after meetings and transmit to meeting participants and affected parties not in attendance.

.7 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.3 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract and prior to commencement of activities at the site.

.2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

.3 Schedule of submission of shop drawings. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Delivery schedule of specified materials and equipment.

.6 Site security.

.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.8 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.11 Monthly progress claims, administrative procedures, photographs, hold backs.

.12 Appointment of inspection and testing agencies or firms.

.13 Insurances, transcript of policies.

1.4 PROGRESS MEETINGS

.1 During course of Work and prior to project completion, schedule progress meetings at the call of the Departmental Representative.

.2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.

.3 Notify parties minimum 7 days prior to meetings.

.4 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.
.2 Review of Work progress since previous meeting.
.3 Field observations, problems, conflicts.
.4 Problems which impede construction schedule.
.5 Review of off-site fabrication delivery schedules.
.6 Corrective measures and procedures to regain projected schedule.
.7 Revision to construction schedule.
.8 Progress schedule, during succeeding work period.
.9 Review submittal schedules: expedite as required.
.10 Maintenance of quality standards.
.11 Review proposed changes for affect on construction schedule and on completion date.
.12 Safety Issues
.13 Other business.

1.5 WORKPLACE ORIENTATION MEETINGS

.1 Frequency: As required for all new workers prior to commencement of working on Site.

.2 Purpose: To familiarize new workers with site conditions, rules, regulations, safety and security requirements.

.3 Attendees: All new Contractor and other personnel scheduled to work on the Site.

.4 Agenda may include the following:

.1 Project description including areas of work.
.2 Hazardous areas including open excavations, construction equipment traffic, blasting, storage of chemicals or explosives, etc.
.3 Safety equipment to be worn by workers.
.4 Traffic rules on the Site.
.5 Evacuation procedures.
.6 First aid procedures.
.7 Excavation or work permit procedures.
.8 WHMIS requirements for storage and handling of chemicals.
.9 Fire safety rules and regulations.
.10 Rules and regulations regarding wildlife, environmental concerns, drugs, alcohol, etc.
.11 Incident reporting
.12 Sign-in procedures

1.6 SAFETY MEETINGS

.1 Frequency: Weekly during the course of the Work for each area of the work.

.2 Purpose: To review safety concerns and implement safety measures.

.3 Attendees: Contractor's and Departmental personnel for each area of work.

.4 Agenda may include the following:

.1 Review and discussion of safety concerns, incidents, accidents and "near misses".

.2 Remedial or preventative actions to be taken.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

Part 1 GENERAL

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 20 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Departmental Representative within 15 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 15 working days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule.

.1 Completion of underwater construction work in the upstream conduit – Nov. 15, 2014.

.2 Interim Certificate (Substantial Completion) – March 31, 2015.

1.5 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.
.2 Shop Drawings, Samples.
.3 Mobilization.
.4 HDPE pipe supply and fusing
.5 Slip lining of upstream conduit.
.6 Slip lining of downstream conduit.
.7 Demolition work.
.8 Gatewell cast-in-place concrete operating deck.
.9 Supply of gate and hoist.
.10 Installation of gate and hoist.
.11 Supply of hatch frame, hatches, vent pipe and ladders.
.12 Installation of hatches, vent pipe and ladders.
.13 Chain link safety fencing.
.14 Canal Excavation.
.15 Supply and installation of canal granular materials and riprap.
.16 Reservoir riprap work.
.17 Testing and Commissioning.
.18 Demobilization.

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

Part 1 GENERAL

1.1 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work is co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Where requested, submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Saskatchewan, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 10 days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

.8 Submissions include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to adjacent work.

.9 After Departmental Representative's review, distribute copies.

.10 Submit 3 prints or 1 electronic copy of shop drawings for each requirement requested in specification Sections or as requested by Departmental Representative.

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of manufacturers' instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.13 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.14 Submit 3 print copies and 1 electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.15 Delete information not applicable to project.

.16 Supplement standard information to provide details applicable to project.

.17 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.18 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Province of Saskatchewan

.1 Occupational Health and Safety Act, 1993, S.S. 2007.

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative monthly.

.4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.

.7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

.9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.4 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.6 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.7 PROJECT/SITE CONDITIONS

.1 Work at site will involve working in and around open water:

1.8 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request resubmission with correction of deficiencies or concerns.

1.9 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Regulations, 1996.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.11 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety related factor, hazard, or condition occurs during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.12 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site related working experience specific to activities associated with both underwater and dry land construction.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.13 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.

1.14 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.15 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

Part 1 GENERAL

1.1 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan (EPP) for review and approval by Departmental Representative. EPP is to present comprehensive overview of known or potential environmental issues which must be addressed during construction. EPP to meet all legislative requirements and include a summary of means to avoid, reduce or manage risks to the environment.

.3 The “Aquatic Habitat Protection Permit (AHPP) Application” is attached to Section 01 41 00 Regulatory for information. Contractor’s Environmental Protection Plan must address and comply with conditions of the AHPP.

.4 Attached to this Section are excerpts taken directly from the report “AAFC – Highfield Dam Rehabilitation” (Golder Associates). The report addresses a larger area and scope of work including raising of the dam. Contractor’s EPP may need to address some of the identified environmental concerns.

.5 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.6 Environmental protection plan: include:

.1 Name of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Name and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Name and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.12 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.15 Pesticide treatment plan: to be included and updated, as required.

1.3 FIRES

.1 Fires and burning of rubbish on site not permitted.

1.4 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.

.2 Do not dispose of waste or any deleterious substances into waterways.

1.5 DRAINAGE

.1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.2 Provide Water Pollution Prevention Plan (WPPP) to identify potential construction activities and materials that could pollute the reservoir or canal. Plan: include prevention, control, monitoring and reporting measures to assure compliance with Federal, Provincial, and Municipal laws and regulations.

.3 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.4 Do not pump water containing suspended materials into waterways.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties where indicated.

.2 Minimize stripping of topsoil and vegetation.

1.7 WORK ADJACENT TO WATERWAYS

.1 Do not dump excavated fill, waste material or debris in waterways.

1.8 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.9 HISTORICAL / ARCHAEOLOGICAL CONTROL

.1 Provide historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.

.2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.10 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

6.5.3 Road Improvements

The upstream end of Highfield Reservoir is currently crossed by an all-weather gravelled farm access road which is between SE30-15-10W3 and NE19-15-10W3. The available information shows that the road is crossed by one 0.9 m diameter corrugated metal pipe (CMP) culvert about 19.8 m long (PFRA Plan 96207). The age and condition of the culvert is unknown.

The road is predominately at an elevation of 724.4 m and thus below top of dam based on an AAFC centreline survey of this road in the early 2000's. AAFC has not reviewed this matter with the local RM of Coulee No. 136. This should be undertaken as part of the final design of the project. It has been assumed approximately 0.6 km of this road will need to be raised to the top of dam elevation. In the absence of more detailed information, the cost of this road raising cannot be estimated to the feasibility level consistent with this report. Based on the limited information, Golder's preliminary cost estimate for the road raise is $128,000. Further information will be required at the final design stage to complete the design of this road.

6.5.4 Environmental Site Assessment

Treasury Board Real Property Environment Policy requires that before acquiring real property, departments must ascertain the environmental condition of the property and determine whether it is or can be made environmentally compatible with its intended use. This is called an Environmental Site Assessment (ESA). Depending on the nature of the land control, there can be up to three phases of an ESA:

- Phase I ESA - A non-intrusive investigation to identify potential liabilities associated with contaminants in soil, sediment, ground or surface water through site inspection and historical review. The guidelines to conduct a Phase I ESA are in accordance with the Canadian Standards Association (CSA) Standard Z768-01.
- Phase II ESA - An intrusive investigation following a Phase I ESA to identify and determine the nature and extent of potential contamination.
- Phase III ESA - Site Remediation.

During the final design phase, AAFC will be required complete an ESA prior to entering into the land acquisition phase of the project. The ESA are usually undertaken by a service arrangement between AAFC and Public Works and Government Services Canada (PWGSC). Other activities AAFC will have to undertake will include legal surveys, land appraisals, negotiations for land acquisition and legal requirements for transfer of title.

7.0 ENVIRONMENTAL CONSIDERATIONS

7.1 Goals and Objectives

The AAFC has initiated a project to rehabilitate Highfield Dam with a focus on improving dam safety and reducing the risks (liability) to AAFC/Government of Canada imposed by the dam. This AAFC goal is expressed in an investment statement that summarized work carried out regarding Highfield Dam to date and provides a business case to move the project forward. A secondary AAFC goal is to ensure that potentially significant environmental effects resulting from the proposed rehabilitation are mitigated. AAFC's objective is to carry out the necessary design and construction steps to modify Highfield Dam in accordance with the *Canadian Environmental Assessment Act*, 2012 (CEAA 2012) and other applicable federal and provincial legislations. Potential risks to the physical, biological, or human environment must be identified such that mitigation measures

can be incorporated into the project and accounted for through a compliance monitoring program that includes best management practices that will be incorporated by AAFC.

7.2 Status of Previous Work

The CEAA 2012 sets out the requirements of environmental assessments and focuses on environmental effects that are within federal jurisdiction, including fish and other aquatic species, aquatic habitat, migratory birds, federal lands, cross-boundary (provincial or international) effects, effects that impact Aboriginal peoples, and any other environmental effects that impact federal decisions. An Environmental Effects Evaluation (EEE) must be undertaken in order to demonstrate compliance with Section 67 of the CEAA (2012). Under Section 6 of the Schedule to the federal Regulations Designating Physical Activities (CEAA 2012), an environmental assessment would be required for a project involving the construction, operation, decommissioning and abandonment of a dam or dyke that would result in the creation of a reservoir with a surface area that would exceed the annual mean surface area of a natural water body by 1,500 ha or more, or an expansion of a dam or dyke that would result in an increase in the surface area of a reservoir of more than 35% is a designated project. However, the Project, as currently proposed, will require the rehabilitation to an existing dam as part of its ongoing maintenance, and as such is not subject to the provisions of the *CEAA (2012)*.

AAFC engaged three consultants to complete environmental baseline studies to support an EEE. These baseline studies include two rare plant, wildlife, fish, and habitat assessments (in 2003 and 2010), and a Heritage Resources Impact Assessment (HRIA). The baseline studies reflect publically available guidelines and information provided by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the federal *Species at Risk Act* (SARA), the Saskatchewan Conservation Data Centre (SKCDC) databases, and Saskatchewan Ministry of the Environment (MOE).

7.2.1 December 2003 – Biological Survey

Jacques Whitford Environment Ltd. (Jacques Whitford) completed a rare plant, wildlife, fish and native habitat assessment of Highfield Dam in 2003. The limits of the assessment included the reservoir, areas potentially impacted as part of construction efforts around the dam and ancillary works, and areas downstream including the Rush Lake Creek. The assessment made use of historical and provincial records. The assessment report was presented in three parts with conclusions presented in Table 13.

Table 13: 2003 Jacques Whitford Study Components Summary

Fish and Fish Habitat	▪ Diverse habitat within the reservoir consists of islands, bays, and large aquatic plant beds. ▪ Reservoir stocked with northern pike, walleye, and lake whitefish. Only northern pike and yellow perch species have established sustained populations. ▪ The reservoir is eutrophic and has experienced fish kill in the past over winters during low reservoir levels (low dissolved oxygen). ▪ The water quality data for Rush Lake Creek is similar to the Highfield reservoir. Both waterbodies contain dense to sparse aquatic vegetation, and flows with sufficient depths to potentially support northern pike and yellow perch.
Rare Plant and Native Habitat (Baseline)	▪ Sixty (60) percent of the habitats surveyed at the Highfield Dam site were native. ▪ Habitat types included Rush Flats, Saline Wet Meadow, and Native Grassland (or Grassland Fragments) that were dominated by native species. ▪ Crested wheatgrass has the highest (continuous) cover of exotic species. ▪ Diverse habitats in the Highfield Dam area may include federally-listed or provincially tracked plant species (none found previously). ▪ Provincially tracked plant species least mousetail (*Myosurus minimus*) and narrow-leaved plantain (*Plantago elongata*) were identified about 700 m downstream of Highfield Dam. ▪ Slender Mouse-ear Cress (*Halimolobos virgata*) was listed as 'Threatened' by COSEWIC. Suitable habitat for this species is present at Highfield Dam.
Wildlife and Wildlife Habitat (Baseline)	▪ Diverse habitats exist and may contain provincially or federally rare or endangered wildlife (none found previously). ▪ Federally listed wildlife sightings included a breeding pair of loggerhead shrikes (*Lanius ludovicianus*) about 100 m downstream of Highfield Dam. ▪ Richardson's ground squirrels were noted in the area. ▪ Waterfowl and songbirds were observed in the area. ▪ Twelve (12) provincially tracked songbirds listed as 'sensitive to population decline' were observed previously in the area. ▪ One northern leopard frog (*Lithobates pipiens*) was observed at Highfield Dam and is listed as 'Special Concern' ▪ Plains spadefoot toad (*Spea bombifrons*) and western hognose snake (*Heterodon nasicus*) are provincially tracked species that may occur at Highfield Dam.

7.2.2 December 2010 – Biological Survey

KGS Group completed a rare plant, wildlife, fish, and native habitat assessment of Highfield Dam in 2010. The KGS assessment was prepared as a supplement to the earlier Jacques Whitford assessment and was intended to present the most current data available for the project site. The assessment emphasized the downstream areas of the dam along Rush Lake Creek, further identifying existing fish and fish habitat, and documented species that had not been previously observed and reported.

The identification of two additional habitat types, namely: the reservoir (RES) including shoreline habitat along the reservoir, and wetland (WET) that includes the areas within and draining into the Rush Lake Creek are notable departures from the Jacques Whitford assessment. KGS notes that portions of the vegetation

communities within the native grassland habitat mentioned by Jacques Whitford may be highly degraded areas and so are more appropriately named as Grassland Fragment (GF) areas.

The northwest shoreline of Highfield Reservoir (from Highfield Dam extending 180 m along the shore) consists almost entirely of sand with varying levels of gravel, rock and cobble that could be used as spawning habitat for white sucker and walleye.

Rush Lake Creek has a number of natural (beaver) and physical (the Highfield Dam) barriers to passage. Low flow trickle areas and stranded pools, back flooded stagnant water, low dissolved oxygen concentrations and point source water quality alterations from agricultural runoff result in unsuitable fish habitat. KGS suggests that the development of fish passage should not be a necessary component of the Highfield Dam rehabilitation based on current constraint conditions.

No large bodied fish were observed in Rush Lake Creek; however, fathead minnow (*Pimephales promelas*) were observed. Yellow perch (*Perca flavescens*), northern pike (*Esox lucius*), white sucker (*Catostomus commersonii*), and walleye (*Sander vitreus*) were identified in the Highfield Reservoir. No federally-listed or provincially tracked fish species were identified.

Three additional provincially tracked plant species were identified within the Highfield Dam area in addition to the least mousetail (*Myosurus minimus*) and narrow leaved plantain (*Plantago elongata*) identified previously by Jacques Whitford in 2003:

- Heart-leaved buttercup (*Ranunculus cardiophyllus*);
- Stream bank wheatgrass (*Elymus lanceolatus var riparius*); and
- Water weed (*Elodea canadensis*).

None of the five provincially tracked species documented in 2003 and 2010 are federally-listed under COSEWIC and are therefore, not federally protected or considered species at risk in Saskatchewan. However, depending on the species and extend of the local population, activity restrictions may be imposed by MOE. Two of these species, stream bank wheatgrass and lance leaved plantain, are no longer tracked provincially by MOE.

In addition to the loggerhead shrike (previously observed in 2003), chestnut collard longspur (*Calcarius ornatus*) and ferruginous hawks (*Buteo regalis*) were also observed in 2010 and are federally-listed as 'threatened' avian species under COSEWIC.

During the 2010 assessment, there were no federally-listed or provincially tracked mammal species identified. No reptiles were observed; however, two species of amphibian were encountered within the wetland habitat, including the northern leopard frog.

7.2.3 July 2012 – Heritage Resource Impact Assessment (HRIA)

Bison Historical Services Ltd. (2012) completed a HRIA for the Highfield Dam site under Archaeological Resource Investigation Permit No. 12-153 issued by the Heritage Conservation Branch (Ministry of Parks, Culture and Sport). The HRIA was completed using a pedestrian reconnaissance and visual inspection program for all portions of the proposed borrow area immediately north of the east abutment of Highfield Dam, while shovel tests were judgementally excavated in areas where buried heritage resources could be encountered.

One previously recorded heritage resource was identified by the Heritage Conservation Branch as being in potential conflict with the proposed borrow area. EbNu-1 was reported in 1964 by the landowner (Mr. Henry Theissen) and documented as a Precontact burial. The original description of the site places its location outside of the borrow area. Bison Historical Services Ltd. did not encounter any evidence of EbNu-1 within the proposed borrow area or in the area immediately to the north.

One previously unrecorded heritage resource was identified during the HRIA and documented as EbNu-29, a Precontact Artifact Scatter consisting of Lithic tools. No other artifacts were observed around the identified site. Bison Historical Services Ltd. (2012) stated that EbNu-29 is 'deemed to have limited heritage resource significance' and given its location well outside the Highfield Dam remediation project footprint, no further work at EbNu-29 was recommended.

The HRIA report prepared by Bison Historical Services Ltd. (2012) recommended the project be granted Heritage Property Act clearance as 'no heritage sites will be impacted by the proposed development'. AAFC received the clearance letter from the Saskatchewan Heritage Conservation Branch on August 7, 2012 (File No. 12-1156).

7.3 Pre-Design Environmental Strategy

Golder has completed the pre-design having reviewed the rare plant, wildlife, fish and habitat assessment and HRIA reports prepared by others. The project layout and anticipated construction footprint have been reviewed in consideration of environmental concerns and species at risk identified in the previous studies. In order to manage potential environmental risks and to meet AAFC's goal that, "no significant environmental effects result from the rehabilitation of the project", Golder recommends AAFC implement various best management practices as provided herein. Golder recommends these best management practices be reviewed during the detailed design phase of work and throughout construction to incorporate any new observations or environmental concerns not previously identified.

Table 14 through Table 17 provide a summary of the potential adverse environmental effects for each of the environmental component (fish and fish habitat, rare plants and native habitat, wildlife and wildlife habitat and heritage resources), as well as the general techniques and best management practices to be considered during and/or after the rehabilitation of the Project.

Table 14: Potential Adverse Environmental Effects and Best Management Practices Concerning Fish and Aquatic Habitat

Environmental Component	Potential Adverse Environmental Effect	Proposed Best Management Practice
Fish	Disturbance to fish populations	■ In-water work may require a *Fisheries Act* Authorization or a Letter of Advice from Fisheries and Oceans Canada (DFO). ■ Provincial Aquatic Habitat Protection Permits and Special Collection Permits may also be required. ■ One or more fish salvage operations may need to be completed to remove fish from isolated work areas before work may proceed. ■ Coffer dams may be required to isolate areas of in-water works. ■ A Total Suspended Sediment (TSS) monitoring program may be needed. ■ Environmental monitors, with experience managing TSS programs, may be required to be on site during in-water construction periods. ■ Spring spawning timing windows, for no in water work, for northern pike and yellow perch from April 1 to May 31 will be adhered to.
Fish Habitat	Disturbance to fish habitat	■ In-water work may require a *Fisheries Act* Authorization or a Letter of Advice from Fisheries and Oceans Canada (DFO). ■ Any construction activities adjacent to water bodies will have to have erosion control measures in place to prevent sediment from entering the water body. ■ Any areas of in-water work will have to be isolated from the rest of the water body, possibly with coffer dams and turbidity curtains. ■ Machinery is not to enter the water body at any time. ■ Machinery used should be clean and free of leaks. ■ Measures should be in place to prevent spills of fuels or oils from entering the water body.

Table 15: Potential Adverse Environmental Effects and Best Management Practices Concerning Vegetation

Environmental Component	Potential Adverse Environmental Effect	Proposed Best Management Practice
Vegetation	Disturbance of vegetation communities.	■ Although portions of the study area have been previously disturbed (e.g., cultivated or modified with introduced perennial forage species), native vegetation communities will be affected by construction activities. Construction will be confined to a specific area within the study area to limit disturbances as much as possible to the surrounding vegetation communities. ■ A limited amount of clearing of shrubs and trees may be required to facilitate construction. Clearing will include removal and mulching of woody material, shrubs, and trees. Natural propagation and regeneration are expected to enhance recovery of these species. ■ Sod and topsoil will be stripped and salvaged from the construction areas to retain the propagules and seed bank found within. ■ Back slopes, side-slopes, and other areas where ground disturbance is necessary within the construction area will be recontoured to a stable profile, and salvaged topsoil will be spread over these areas. Micro-variations, such as track imprints or other small surface undulations, can be left to create safe sites for germinating plant species. ■ Natural plant regeneration will be promoted. However, following the recontouring of areas of exposed soils within the construction area, these areas will be seeded with an approved native seed mixture to promote surface stability, mitigate sheet wash, rill, or gully formation, wind/water erosion, and enhance aesthetics.
	Loss and/or disturbance to listed plant species and habitat.	■ Five provincially tracked plant species have been previously identified within the study area, ■ Pre-construction surveys will be completed and the locations of where the plant species were previously identified will be re-visited and will be flagged for avoidance. ■ If the plant species are identified during the pre-construction surveys, the Saskatchewan MOE will be contacted to determine what specific mitigation measures should be implemented. This would include the use of temporary fencing or barricades to avoid disturbances to the plans, activity setback distances or salvage and relocation of the individual plants outside of the area of disturbance on a similar habitat type. Transplanting to suitable/similar adjacent habitat should be considered only after other options have been considered. A scientific permit/permission from MOE is required prior to transplant plants.
	Potential for introduction of noxious and nuisance weeds.	■ Machinery will be cleaned prior to entrance into the study area and again before leaving the study area. Certified seed mixtures will be used for revegetation in consultation with AAFC. ■ If used for reclamation, hay/straw mulches will be obtained from a local source and inspected for noxious weeds prior to use. ■ Should weedy intrusions or spread occur that resulted directly from the Project, they will be promptly addressed using reasonable control measures that are determined in consultation with the appropriate regulator.

MOE = Ministry of Environment; AAFC = Agriculture and Agri-Food Canada

Table 16: Potential Adverse Environmental Effects and Proposed Best Management Practices Concerning Wildlife

Environmental Component	Potential Adverse Environmental Effect	Proposed Best Management Practice
Wildlife Habitat	Loss or alteration of wildlife habitat.	■ Although portions of the study area have been previously disturbed, construction will occur within areas that retain natural vegetation communities (e.g., grass and forb communities, shrub and tree communities, wetland, and riparian habitats). To limit potential disturbances to wildlife habitat as much as possible, construction will be confined to specific areas within the approximate area of interest (e.g., raised embankments and toe berm, west and east spillways, east outlets). ■ No unique wildlife habitats will be lost as a result of the Project. ■ Baseline field surveys were completed in 2003 and 2010 to identify sensitive habitat locations for avoidance or mitigation. Potential sensitive habitat (e.g., native grassland, steep valley side slopes, riparian areas) will be avoided as much as possible within the approximate area of interest. ■ All areas disturbed will be reclaimed to promote re-establishment of habitat types that existed prior to construction. ■ Vegetation regeneration and encroachment will be encouraged within the study area to assist in the re-habilitation of useable habitat.
	Nest sites could be affected.	■ Construction will be confined to a specific area within the study area to limit disturbances to potential nesting and rearing habitat. ■ Construction activities may occur during the spring/summer period on native grassland and riparian areas (within the study area) and may potentially affect grassland and riparian nesting migratory bird species. If construction occurs during the sensitive nesting and breeding period (prior to August 31), a wildlife monitor may be required by Environment Canada (as part of their condition of approval) to complete a nest search of the construction area and adjacent habitats. A recommended activity restriction guideline of 50 m will be adhered to should an occupied nest site of a migratory bird be encountered, per standard recommendations for addressing potential effects to nesting migratory birds protected under the *Migratory Birds Convention Act* (P. Gregoire, pers. comm. 2012). ■ Removal of shrub and treed habitat to accommodate construction may potentially affect shrub-nesting migratory bird species (e.g., loggerhead shrikes) and raptor species (e.g., ferruginous hawks). To avoid disturbance to these species during the nesting period, shrubs and trees should be removed during the fall/winter period and mulched prior to the early spring (April 15) when these species typically return to set up nesting territories. If this is not possible, Activity Restriction Guidelines (Saskatchewan MOE 2013) will be adhered to should an occupied nest site be encountered. These guidelines outline recommended setback distances for particular listed wildlife species in Saskatchewan whereby specific activities must avoid known nesting locations for a specific distance. For example, the recommended setback distance that activities must avoid a loggerhead shrike nest by is 500 m.

Table 16: Potential Adverse Environmental Effects and Proposed Best Management Practices Concerning Wildlife (continued)

Environmental Component	Potential Adverse Environmental Effect	Proposed Best Management Practice
Wildlife (cont.)	Nest sites could be affected (continued).	■ Depending on the timing of construction in the spring/summer period and the extent of construction a wildlife monitor may be required by Environment Canada to complete a nest search within 200 m of the construction area to identify occupied ground nests (e.g., Sprague's pipit nests). Activity Restriction Guidelines (Saskatchewan MOE 2013) will be adhered to should an occupied nest site be encountered. These guidelines outline recommended setback distances for particular listed wildlife species in Saskatchewan whereby specific activities must avoid known nesting locations for a specific distance. For example, the recommended setback distance that activities must avoid a Sprague's pipit nest by is 200 m.
	Construction activities may cause temporary displacement of wildlife or restrict wildlife movement.	■ Construction will be completed in an expeditious manner as safety allows. ■ Construction will be confined to specific areas within the study area to limit disturbances to wildlife. ■ Alternative and similar habitat is readily available outside of the study area that can be used by temporarily displaced wildlife. ■ Resident wildlife in the area may have habituated to the existing land use (i.e., ranching, crop production, and highway use). ■ Construction activities will be completed in such a manner that will not create barriers for wildlife (i.e., will allow connectivity between habitat types) or result in additional restrictions to wildlife movement other than those that currently occur with the present land use (i.e., existing infrastructure and transportation corridors). Potential barriers to wildlife, particularly small mammals, reptiles and amphibians, are expected to be confined to the Project footprint, likely at site-specific locations where the Project components bisect native habitat patches (e.g., Rush Lake Creek).
	Increased vehicle-wildlife collisions.	■ Equipment operators and construction personnel will be instructed to be aware of wildlife in the study area. ■ Safe speed limits will be enforced during construction.
	Wildlife harassment and habituation.	■ Project personnel will be instructed to keep a clean work area and to not to feed or otherwise harass wildlife encountered. ■ Garbage and wastes will be properly disposed of to avoid attracting scavenger species.
Listed Wildlife Species	Potential disturbance to listed wildlife species.	■ Unique or sensitive habitat types that may be used by listed wildlife species will be avoided as much as possible and construction activities will be confined to a specific area within the study area to limit the spatial extent of potential disturbances to listed wildlife species. Baseline field surveys were completed in 2003 and 2010 to identify sensitive habitat and potential nesting and breeding locations by listed wildlife species and loggerhead shrike, chestnut collared longspur and ferruginous hawk were federally listed wildlife species were identified. If construction occurs during the sensitive nesting and breeding period (prior to August 31), a wildlife monitor may be required by Environment Canada (as part of their condition of approval) to complete a nest search of the construction area and adjacent habitats. Activity Restriction Guidelines (Saskatchewan MOE 2013) will be adhered to should an occupied nest site be encountered.

Table 16: Potential Adverse Environmental Effects and Proposed Best Management Practices Concerning Wildlife (continued)

Environmental Component	Potential Adverse Environmental Effect	Proposed Best Management Practice
Listed Wildlife Species	Potential disturbance to listed wildlife species.	■ Northern leopard frogs were identified in the study area during the previous baseline field surveys, and could be affected by construction activities. Where possible, a 400 m buffer will be maintained year-round from seasonal wet areas that have suitable breeding habitat for this species. Further, a 400 m buffer will be maintained around wetlands known to provide wintering sites for the period of September through May to protect frogs moving to and from wintering sites, and during hibernation at these sites. ■ It is understood that the oxbows and standing water areas within 50 m of the proposed toe berm will be partially or wholly de-watered to facilitate construction activities. It is our understanding that these areas typically maintain shallow water levels and generally freeze to the bottom during the winter season. For this reason, these areas are not considered suitable as overwintering habitat for northern leopard frogs, and therefore may not warrant any mitigation measures to occur prior to construction. However, if these oxbows and standing water areas do require de-watering prior to excavation, an environmental monitor will be on-site to capture and re-locate northern leopard frogs (if present) during the de-watering process.

MOE = Ministry of Environment; m = metres

Table 17: Potential Adverse Environmental Effects and Proposed Best Management Practices Concerning Heritage Resources

Environmental Component	Potential Adverse Environmental Effect	Proposed Best Management Practice
Heritage Resources	Disturbance to previously undiscovered archaeological sites during construction	■ An HRIA was conducted for the Project; no known sites are in conflict with the Project. ■ In the event that unanticipated archaeological materials or features (including but not limited to, hearth features, lithic, ceramic and faunal artifacts, and human remains) are encountered during construction activities, it is recommended that all work in the immediate area cease and the Heritage Conservation Branch be contacted for further guidance.

HRIA = Heritage Resources Impact Assessment

7.4 Sediment and Erosion Control

The Canadian Master Specifications and industry standard practice for construction contracts is to include a 'Care of Water' or 'Preservation of Watercourses' specification. The specification requires the Contractor to submit a Care of Water, or Preservation of Watercourses Plan that is inclusive of an Erosion and Sediment Control Strategy. The plan is a required submission by the Contractor for approval prior to commencing construction activities. The erosion and sediment control practices are designed using site specific mitigation and control strategies to prevent deleterious materials/substances from affecting a watercourse. Measures are to be site specific and may include, but are not limited to, simple silt fencing, fabric rolls, sediment ponds, and pumping strategies.

Part 1 GENERAL

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with federal, provincial or local codes provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 REGULATORY RESPONSIBILITY

.1 Conform to Regulatory Requirements, pay all fees and give all notices they require.

.2 Obtain approvals necessary for the Work and the Contract from the regulatory agencies having jurisdiction, except those approvals obtained by the Departmental Representative as identified in this section.

.3 Department will obtain those approvals that involve agreement between Department and the Regulatory Agency having jurisdiction. The Department has applied to the Water Security Agency for an Aquatic Habitat Protection Permit (AHPP).

1.3 REGULATORY REQUIREMENTS VARIANCE

.1 If the Contract Documents are at variance with Regulatory Requirements, notify Departmental Representative in writing, requesting direction, immediately after such variance becomes known.

.2 The Departmental Representative may make Changes in the Work due to Regulatory Requirements. Any cost associated with authorized changes will be valued in accordance with the General Conditions.

.3 If the Contractor fails to provide written notice and performs work knowing it to be contrary to Regulatory Requirements, the Contractor accepts responsibility for correcting violations thereof, and bears the costs, expenses and damages attributable to the Contractor's failure to comply with the provisions of such Regulatory Requirements.

1.4 HAZARDOUS MATERIAL DISCOVERY

.1 Stop work immediately when material hazardous to health of workers or the public is encountered during demolition work. Notify Departmental Representative.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

Water Security Agency

Aquatic Habitat Protection Permit Application

Note: Work is not authorized until a permit has been issued

Name of Applicant: Serena Ward on behalf of Agriculture and Agri-Food Canada Telephone No.: 306-523-6743

Mailing Address: 300-2010 12th Avenue Postal Code: S4P 0M3

Name of Registered Land Owner: Agriculture and Agri-Food Canada Telephone No.: 306-523-6743

Location of proposed work (Lot/Block, Twp/Rg, UTM or Lat/Long): NE 36-15-11 W3M

Name of Affected Water Body or Watercourse: Highfield Reservoir

All applications MUST contain the following information (use back of application if additional space is required):

1) Description of proposed work or development:
Agriculture and Agri-Food Canada (AAFC) owns and operates the Highfield Dam at the Highfield Reservoir. AAFC is proposing to undertake work on the west low level outlet where the concrete elements of the conduit and the gatewell have weakened and now have structural capacity below structural design code. The proposed rehabilitation activity will strengthen the west low level outlet by slip lining the existing square conduit with a smaller diameter round HDPE pipe and sealing and securing it in place with grout. This will improve the structural performance of the conduit with minimal disturbance to the dam and discharge capacity.

2) Description of area where work is to take place including slope, distance from water, soil type, substrate and vegetative cover:
The construction activities will be localized to the area in and around the West Low Level Outlet of Highfield Dam. The installation of the upstream lining of the conduit will be undertaken by commercial divers working in the water using a grout material mix design suitable for placement in underwater situations. The HDPE pipe will be lowered into position by a crane working from a pre-existing and disturbed access location along the top of dam. The divers will then direct it into position manually. A bulkhead will be built and the annual space will be drained of water prior to grouting operation. The grouting of the downstream side of the conduit will take place in dry, no flow conditions. There will be no disturbance to the lakebed, shoreline or vegetation during this component of the project.

3) Construction schedule, type of construction materials and equipment to be used: Construction activities are scheduled to commence in the Fall of 2014. The slip-lining of the upstream portion of the conduit will take place before the reservoir is covered with ice. Construction is expected to take a total of two (2) weeks, however, downstream activities may continue throughout the winter, with a final deadline of May 1, 2015.

4) Proposed measures to mitigate or prevent any potential impact of the activity on aquatic and riparian habitats, including erosion and sediment control plans:

1. There will be no use of heavy machinery in the reservoir during this project, other than lowering the HDPE pipe into position by a crane (or other similar equipment) working from the shoreline. All machinery used during the project will operate from the top of the dam and/or existing road surfaces.
2. There will be no disturbance to existing shoreline or aquatic vegetation during the work.
3. Flows through the west low level outlet will be ceased during the work.
4. Appropriate precautions will be taken to ensure that deleterious substances do not enter any waterbody. All materials and equipment will be operated, maintained and stored in a manner that prevents any deleterious substances (fuel, oil, grease, hydraulic fluids, coolant, paint, uncured concrete and concrete wash water, etc.) from entering fish habitat.
5. Any soils that are exposed and/or have significant potential for sediment delivery to the reservoir will be stabilized immediately following activities at the site to minimize potential erosion. If necessary, these areas will be re-seeded and/or revegetated as soon as appropriate soil conditions are present at the site.

6. The HDPE pipe will be inspected to ensure it is clean and free of any dirt, contaminants, etc. before lowering it into the water.
7. Only grout that is not toxic to the aquatic environment will be used to seal and secure the HDPE pipe on the reservoir side of the dam during this project.
8. If the grout has the potential to cause temporary increases in pH, the area around the HDPE inlet will be isolated from the reservoir by installing a barrier curtain around the work area. This curtain will be impenetrable to water, be suspended from the water surface and deep enough to remain in contact with the lakebed (e.g., weighted down with chains) while the divers are working within it. The curtain will be installed in such a way as to exclude any fish from within the contained area. If fish become trapped within the contained area, they will be removed prior to undertaking the grouting. The area inside the curtain will be monitored for pH levels and will remain in place until pH levels return to acceptable levels (6.5-9.0) according to the CCME guidelines. If necessary, carbon dioxide will be pumped into the contained area to help return pH levels to acceptable levels. Once pH levels have returned to normal, the curtain will be removed.
9. Areas used for stockpiling construction materials or other equipment storage shall be well back from the edge of any waterway and, if possible, in areas which have already been disturbed or are devoid of vegetation.
10. There should be no need for any machinery to enter the wetted portion of the reservoir during this project. All heavy machinery working near the water will be free of external grease, oil and mud and, if necessary, pressure washed off site before being used in the project.
11. Any spilled materials will be cleaned up as soon as possible and disposed of in an environmentally safe manner. Spilled material will not be left where it may enter any watercourse.
12. Emergency spill kits will be onsite in the event of an accidental spill of oil, fuel, hydraulic fluid or coolant during the project. The operators of the equipment should be familiar with how to properly use the spill kits in the event of an emergency.

5) Plans for restoring the environment after the proposed activity has been completed, including replacing or restoring vegetation: There should be no impacts to the aquatic or terrestrial environment during this project. If terrestrial vegetation is accidentally impacted during the work, the impacted area will be stabilized and if necessary, re-seeded with an acceptable seed mix and/or planted with native vegetation. Sediment and erosion control measures will be incorporated into the work, as required, to ensure there is no erosion of materials into the reservoir during or after the work is complete.

Inclusive of accurate maps, photos and plans will normally aid in project review and reduce review time

Signature of Applicant _____ Date _____

An approval granted here does not release the applicant from the responsibility of obtaining any other approvals that may be required under federal, provincial or municipal legislation.

Part 1 GENERAL

1.1 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit sedimentation and contaminant control plan for all in-water work.

1.2 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.3 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding and temporary stairs and ladders.

1.4 HOISTING

.1 Provide, operate and maintain hoists and cranes as required for moving of materials and equipment.

.2 Hoists and cranes to be operated by qualified operator.

1.5 CONSTRUCTION PARKING

.1 Parking will be permitted on site.

.2 Provide and maintain adequate access to project site.

1.6 SECURITY

.1 Provide and pay for site security personnel to guard site and contents of site after working hours and during holidays as deemed necessary by the Contractor.

1.7 OFFICES

.1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.8 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.9 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.10 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.13 Provide snow removal during period of Work.

.14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.11 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION

3.1 EROSION AND SEDIMENTATION CONTROL

.1 Provide control measures to prevent discharge of sediments or deleterious materials into the reservoir during construction activities according to requirements of authorities having jurisdiction.

.2 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

.3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE RESTORATION

.1 Upon completion of Work, remove all temporary construction facilities, including haul roads. Restore the site to condition acceptable to Departmental Representative

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

.1 Within text of each specification section, reference may be made to reference standards.

.2 Conform to these reference standards (most recent edition), in whole or in part as specifically requested in specifications.

.3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance. In event of non-conformance, cost of testing will be borne by Contractor.

1.2 DELIVERY, STORAGE, HANDLING

.1 Inspect each shipment of products and timely replace any missing or damaged items.

.2 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.3 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.4 Store products subject to damage from weather in weatherproof enclosures.

.5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.6 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

Part 2 PRODUCTS

2.1 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

2.2 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

Part 3 EXECUTION

3.1 INSTALLATION

.1 Unless otherwise indicated in specifications install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

.3 Inform Departmental Representative of conflicting installation. Install as directed.

.4 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and reinstallation at no increase in Contract Price or Contract Time.

3.2 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

3.3 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Retain specialists familiar with materials affected to perform remedial work in a manner that neither damages nor puts at risk any portion of Work.

END OF SECTION

Part 1 GENERAL

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.3 Clear snow and ice from access to structure.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site containers for collection of waste materials and debris.

.6 Dispose of waste materials and debris off site.

.7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.8 Provide adequate ventilation during use of volatile or noxious substances.

.9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.2 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.5 Remove dirt and other disfiguration from exterior surfaces.

.6 Repair, patch and touch-up marred surfaces to match adjacent finishes

.7 Excavate and dispose of contaminated and excess soils including granular and riprap material.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

Part 1 GENERAL

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Departmental Representative Inspection.

.2 Departmental Representative Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and are fully operational.

.4 Operation of systems has been demonstrated to Owner's personnel.

.5 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.

.6 Commencement of Lien and Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment: when Departmental Representative considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

.8 Payment of Holdback: after issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount.

1.2 CLEANING

.1 In accordance with Section 01 74 11 - Cleaning.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

Part 1 GENERAL

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.3 Draft copy will be returned with Departmental Representative's comments.

.4 Revise content of documents as required prior to final submittal.

.5 Two weeks prior to Total Performance of the Work, submit to the Departmental Representative four final copies of operating and maintenance manuals in English.

.6 Ensure spare parts, maintenance materials and special tools provided are new, undamaged and of same quality and manufacture as products provided in Work.

.7 Furnish evidence, if requested, for type, source and quality of products provided.

.8 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.9 Pay costs of transportation.

1.2 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide electronic, scaled CAD files in dwg format on CD.

1.3 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

- .1 Date of submission; names.
- .2 Addresses, and telephone numbers of Contractor and Sub-contractors with name of responsible parties.
- .3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

- .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.4 AS-BUILTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

1.5 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, provided by Departmental Representative.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements in relation to a geodetic datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.

.7 Provide digital photos of construction for site records.

1.6 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and any special operating instructions.

.3 Maintenance Requirements: include routine procedures and guide for trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.4 Provide servicing and lubrication schedule, and list of lubricants required.

.5 Include manufacturer's printed operation and maintenance instructions.

.6 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.7 Additional requirements: as specified in individual specification sections.

1.7 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Departmental Representative . Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.8 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Departmental Representative Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.9 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

1.10 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.11 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, 15 days before planned pre-warranty conference, to Departmental Representative approval.

.3 Warranty management plan to include required actions and documents to assure that Department receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder and submit upon acceptance of work. Organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.7 Except for items put into use with Department's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Conduct joint 6 month warranty inspection, measured from time of acceptance, by Departmental Representative.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include water control slide gate and hoist.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at 6 month post-construction warranty inspections.

.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in a timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification will follow oral instructions. Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.12 PRE-WARRANTY CONFERENCE

.1 Meet with Departmental Representative, to develop understanding of requirements of this section. Schedule meeting prior to contract completion and at time designated by Departmental Representative.

.2 Departmental Representative will establish communication procedures for:

.1 Notification of construction warranty defects.

.2 Determine priorities for type of defect.

.3 Determine reasonable time for response.

.3 Provide name, telephone number and address of licensed and bonded company that is authorized to initiate and pursue construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.13 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.
.4 Contract number.
.5 Warranty period.
.6 Inspector's signature.
.7 Construction Contractor.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION - NOT USED

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA S350, Code of Practice for Safety in Demolition of Structures.

1.2 SUBMITTALS

.1 Submit shop drawings in accordance with Sections 01 33 00 - Submittal Procedures.

.2 Before proceeding with demolition of concrete at gatewell and where required by authority having jurisdiction submit for review by Departmental Representative shoring and debris containment platform drawings prepared by qualified professional engineer registered or licensed in the Province of Saskatchewan, showing proposed method.

Part 2 PRODUCTS - NOT USED

Part 3 EXECUTION

3.1 PREPARATION

.1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

3.2 PROTECTION

.1 Prevent movement, settlement, or damage to part of structure to remain in place. Provide bracing and shoring required.

.2 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.

3.3 SALVAGE

.1 Refer to drawings and specifications for items to be salvaged for reuse.

.2 Remove items to be reused, store as directed by Departmental Representative.

3.4 SITE REMOVALS

.1 Remove items as indicated.

3.5 DEMOLITION

.1 Remove parts of existing structure to permit new construction. Work includes concrete demolition at top of gatewell including the existing corbel, existing gate, hoist, hatch, ladder and stop log guides.

.2 Trim edges of partially demolished elements to tolerances as defined by Departmental Representative to suit future use. Repair rough surfaces.

.3 Roughen and clean gatewell concrete where new operating deck will be poured.

.4 Do not remove existing water control gate until the new gate is on site and ready to be installed.

3.6 DISPOSAL

.1 Dispose of removed materials, except where specified otherwise, in accordance with authority having jurisdiction.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM C 109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
- .2 ASTM C 495, Standard Test Method for Compressive Strength of Lightweight Insulating Concrete.
- .3 ASTM C 796, Standard Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam.
- .4 ASTM C 869, Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete.
- .5 ASTM C 882, Standard Test Method for Bond Strength of Epoxy Resin Systems Used with Concrete by Slant Shear.

.2 CSA International
- .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .3 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.

1.02 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:
- .1 Submit placing drawings prepared in accordance with plans to clearly show size, shape, location and necessary details of reinforcing.
- .2 Submit drawings showing formwork and falsework design to: CSA A23.1/A23.2.

1.03 QUALITY ASSURANCE

.1 Provide to Departmental Representative 2 weeks minimum prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

.2 Quality Control Plan:
- .1 Ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative.
- .2 Provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements.
- .3 Pour Schedule: Submit proposed pour extent and sequencing schedule to Departmental Representative for approval.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
- .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
  - .1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
  - .2 Deviations to be submitted for review by the Departmental Representative

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

2 PRODUCTS

2.01 DESIGN CRITERIA

.1 Alternative 1 - Performance: to CSA A23.1/A23.2 and as described in MIXES of PART 2 - PRODUCTS.

2.02 MATERIALS

.1 Cement: to CSA A3001, Type HS.

.2 Water: to CSA A23.1/A23.2.

.3 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.

.4 Other concrete materials: to CSA A23.1/A23.2.

2.03 MIXES

.1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.

.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance.

.2 Provide concrete mix to meet following hard state requirements:

.1 Intended application: Underwater placed concrete, reinforced structural concrete at gatewell operating deck and outlet basin end wall.

.2 Durability and class of exposure: F-1.

.3 Compressive strength at 28 days: 30 MPa minimum.

.4 Aggregate size 20 mm maximum.

.5 Underwater placed concrete slump at point and time of discharge: 100 to 125 mm if pumped, 170 mm if placed with tremie pipe.

.6 Admixtures: to approval of Departmental Representative. Use anti-washout admixture for underwater placed concrete to prevent segregation and cement washout. Use admixtures to correct deficiencies in mix or to improve placement of concrete.

.1 Departmental Representative may withdraw prior approval of admixture if conditions encountered during course of work indicate unsatisfactory results.

.2 Do not use calcium chloride or materials containing calcium chloride.

.3 Provide concrete mix to meet following hard state requirements:

.1 Intended application: Lightweight cellular concrete for grouting of annular space between conduit and HDPE pipe liner. See Section 35 53 33 Conduit Rehabilitation – Slip Lining.

.2 Foaming agent conforming to ASTM C869.

.3 Wet Cast Density 800 kg/m^3 (50 pcf) minimum.

.4 Compressive strength: 0.7 MPa (100 psi) in 24 hours, 2.1 MPa (300 psi) in 28 days.

.5 Admixtures proposed by mix designer to be reviewed by Departmental Representative.

.4 Provide concrete mix to meet following hard state requirements:

.1 Intended application: Mass (unreinforced) concrete pipe encasement in the outlet basin.

.2 Durability and class of exposure: F-2

.3 Compressive strength at 28 days: 15 MPa minimum.

.4 Aggregate size 20 mm maximum.

.5 Admixtures: to approval of Departmental Representative. Use admixtures to correct deficiencies in mix or to improve placement of concrete.

.1 Departmental Representative may withdraw prior approval of admixture if conditions encountered during course of work indicate unsatisfactory results.

.2 Do not use calcium chloride or materials containing calcium chloride.

.6 Alternate: Lightweight cellular concrete as per Section 35 53 33 will be considered as an alternate to the 15 MPa concrete.

.5 Concrete supplier's certification.

.6 Provide quality management plan to ensure verification of concrete quality to specified performance.

3 EXECUTION

3.01 PREPARATION

.1 Provide Departmental Representative 48 hours notice before each concrete pour.

.2 Place concrete reinforcing in accordance with the construction drawings and CSA A23.1/A23.2.

.3 During concreting operations:
.1 Development of cold joints not allowed.
.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Protect previous Work from staining.

3.02 INSTALLATION/APPLICATION

.1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.

.2 Ensure that extent of concrete pour does not overstress and damage the existing structure.

.3 Place concrete in one continuous operation to full depth required.
.1 Supply complete equipment for every phase of operation.
.2 Provide sufficient supply of concrete to complete pour without interruption.

.4 Embedments:
.1 Cast in all anchors, reinforcement, hatch frames, bolts, and other inserts required to be built-in.

.5 Underwater concrete placement.
.1 Tremie method for underwater concrete placement.
.1 Provide water-tight tremie pipe sized to allow free flow of concrete. Diameter of tremie pipe to be minimum 200 mm and minimum eight times maximum size of coarse aggregate.

.2 Provide hopper at top of tremie pipe and means to raise and lower tremie pipe.
.3 Provide plug or foot valve at bottom of tremie pipe to permit filling pipe with concrete initially.
.4 Start placement with tremie pipe full of concrete. Keep bottom of pipe buried minimum 300 mm in freshly placed concrete. Control rate of flow by varying depth of pipe bottom in concrete.
.5 If seal is lost, allowing water to enter pipe, withdraw pipe immediately. Refill pipe, and continue placing as specified.
.6 If tremie operation is interrupted so that horizontal construction joint has to be made, cut surface laitance by jetting, within 24 hours and remove loose material by pumping or air lifting before placing next lift.
.7 Do not vibrate, disturb or puddle concrete after placement.

.2 Pumped concrete method.
.1 Follow procedures as for tremie method in placing concrete using discharge line from concrete pump as tremie pipe.
.2 Pump discharge line to have minimum diameter of 125 mm.

3.03 FINISHES

.1 Formed surfaces exposed to view: sack rubbed finish in accordance with CSA A23.1/A23.2.

.2 Operating Deck: Trowel smooth to provide lightly brushed non-slip finish.

3.04 CURING

.1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.

3.05 SITE TOLERANCES

.1 Concrete floor slab finishing tolerance to CSA A23.1/A23.2.

3.06 FIELD QUALITY CONTROL

.1 Concrete testing: to CSA A23.1/A23.2 by testing laboratory designated and paid for by Departmental Representative.

3.07 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Use trigger operated spray nozzles for water hoses.

.3 Designate cleaning area for tools to limit water use and runoff.

.4 Cleaning of concrete equipment to be done in accordance with Section 01 35 43 Environmental Procedures.

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

.1 Prefabricated aluminum hatch and removable panels, with cast-in frame, operable hardware, and appurtenances.

1.2 RELATED SECTIONS

.1 Section 01 61 01 Products and Execution

.2 Section 03 30 00 - Concrete.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International).
- .1 CSA W47.1 Certification of Companies for Fusion Welding of Steel.
- .2 CSA W47.2 Certification of Companies for Fusion Welding of Aluminum.
- .3 CSA W59.2 Welded Aluminum Construction..

1.4 SUBMITTALS

.1 Section 01 33 00: Submittal Procedures.

.2 Provide shop drawings on unit construction, sizes, configuration, jointing methods and locations when applicable, and attachment method for review by Departmental Representative.

.3 Manufacturer's Installation Instructions: Indicate special installation criteria, interface with adjacent components.

Part 2 PRODUCTS

2.1 HATCHES AND REMOVABLE PANELS

.1 Cast-in, flush mount, non-water tight, operable hatch and removable panels.

.2 Approved Manufacturer:

- .1 MSU Mississauga Ltd.
- .2 Substitutions: Refer to Section 01 61 01.

.3 Dimensions: Custom sizing as shown on the drawings.

.4 Design Load: Operable hatch and removable panels to be designed for a uniform live load of 9.6 kPa with a maximum deflection of 4 mm. If non-integral structural supports are required spanning the opening, they must be removable (bolted connections).

.5 Aluminum Frame: frame extrusion complete with welded anchors for casting in concrete and locking tabs to align with panels and hatch.

.6 Removable Aluminum Panels: 6 mm minimum thickness tread plate complete with welded integral reinforcing bars, recessed drop handles and locking tabs.

.7 Operable Aluminum Hatch: 6 mm minimum thickness tread plate complete with welded integral reinforcing bars, hinges, 90 degree hold open arm, recessed drop handle and lock tab.

2.2 FABRICATION

.1 Fabricate components free of visual distortion or defects.

.2 Welding to conform to CSA W47.2 and W59.2.

Part 3 EXECUTION

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Aluminum surfaces in contact with cementitious materials or dissimilar metals to be coated with bituminous paint.

.3 Adjust hinges for smooth operation.

END OF SECTION

PART 1 GENERAL

1.1 DEFINITIONS

.1 "Canal Excavation" is the excavation of soil materials from the inside side slopes and bed of the existing canal to a depth of 300 mm or as directed by the Departmental Representative.

.2 "Topsoil" means the uppermost part of the soil, ordinarily moved in tillage, or its equivalent in uncultivated soils, and normally ranging in depth from 50 mm to 450 mm.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 STRIPPING

.1 Waste Fill zones adjacent to the canal banks must be stripped to provide an area for disposal of canal excavation material. Do not strip any area without prior authorization of the Departmental Representative.

.2 Do not drive on undisturbed areas except for performance of the stripping operation. Stay on temporary access and haul roads, and do not disturb grassed or natural areas.

.3 Strip Topsoil to depth as determined by Departmental Representative from the Waste Fill zones where waste canal excavation will be disposed.

.4 Stockpile Topsoil adjacent to the stripped area.

3.2 CANAL EXCAVATION

.1 Excavate canal to the lines, grades, and elevations specified in the Contract Documents, unless established otherwise by the Departmental Representative.

.2 The Departmental Representative will identify unsuitable bearing soils when encountered at the specified level. Carry the excavation deeper to remove unsuitable bearing soils and replace excavated soil with materials as directed by the Departmental Representative.

.3 The Departmental Representative will determine if suitable bearing conditions are found above the lines, grades, and elevations specified in the Contract Documents. Adjust excavation lines as directed by the Departmental Representative to accommodate the raised foundation.

.4 Fill unauthorized over-excavation to the lines, grades, and elevations specified in the Contract Documents using materials as directed by the Departmental Representative at no cost to the Departmental Representative.

.5 In cold weather, perform canal excavation, loading, hauling, dumping, wasting and spreading in a continuous operation to avoid freezing of the materials before the specified surface has been achieved.

.6 Minimize the depth of frost penetration into the underlying materials in canal excavation areas by sequencing excavation and placement of granular materials and riprap to minimize the exposed areas, and by keeping equipment traffic to a minimum.

.7 Load, haul and, spread excavated canal material in adjacent Waste Fill zones on the outside of the canal banks as directed by the Departmental Representative. Spread the waste fill in maximum loose lift thickness of 500 mm. Compact each lift to a minimum of 85% of Standard Proctor Maximum Dry Density. Grade the waste fill surface to provide a neat, uniform and free draining surface.

3.3 TOPSOIL PLACEMENT

.1 Scarify the waste fill surface (sub-grade) to a minimum depth of 100 mm. Scarify the entire sub-grade area once in the longitudinal direction, and once in the perpendicular direction.

.2 Remove roots, rocks greater than 100 mm in diameter, debris, and other deleterious materials that are on top of the sub-grade.

.3 Disc the sub-grade area when large lumps are prevalent.

.4 Place Topsoil from stockpiles in an unfrozen condition, in dry, calm weather.

.5 Spread the Topsoil to provide a uniform thickness over the entire area.

.6 Remove weeds, roots, rocks greater than 100 mm in diameter debris, and other deleterious materials from the Topsoil.

.7 Grade the Topsoil to eliminate uneven areas, and to provide positive drainage.

.8 Use the track weight of a crawler tractor to compact Topsoil. On slopes, travel and compact in an upslope and down slope direction, so that preferential surface runoff paths are not created.

.9 Minimize traffic on placed Topsoil to avoid over–compaction.

3.4 FINISH GRADING PRIOR TO SEEDING

.1 Fine grade Topsoil areas to remove humps and hollows.

.2 Cultivate and rake the Topsoil surface to produce a loose friable bed.

.3 Provide a finished Topsoil surface that is ready for seeding, and that does not require additional preparation of any kind.

3.5 CLEAN–UP

.1 Dispose of roots, debris, and other deleterious materials.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

.1 Work of this Section includes the supply and installation of granular materials and riprap within the canal and the loading, transporting and placing of Department owned riprap in the reservoir at the gatewell.

1.2 DEFINITIONS

.1 "Effective Particle Size (D_e)" of rock particles is calculated as follows:

$$D_e = \sqrt[3]{\frac{M}{523.6 \times G_s}}$$

Where D_e = Effective particle size measured in metres.
M = Particle mass measured in kilograms.
G_s = Specific gravity of particle = 2.60 unless otherwise measured.

.2 "Percent Passing by Mass" means the cumulative mass of particles that are finer than a specified size expressed as a percentage of the total mass of the sample.

.3 "Durability Absorption Ratio" of rock particles is determined as follows:

$$DAR = \frac{\text{Durability Index}}{\text{Absorption} + 1}$$

Where: DAR = Durability Absorption Ratio of rock particles.

Durability Index of the rock particles is determined by CAL.229.

Absorption of the rock particles is determined by CAL.206 and is expressed as a percentage.

1.3 REFERENCES

.1 Provide earthwork materials in accordance with the following standards (latest revision) except where specified otherwise.

.2 American Society for Testing and Materials (ASTM)

.1	ASTM D422	Standard Method for Particle Size Analysis of Soils.
.2	ASTM D1140	Standard Test Method for Amount of Material in Soils Finer than the No. 200 (75µm) Sieve.
.3	ASTM D2487	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

.3 California Division of Highways

.1	CAL. 206	Test Method for Specific Gravity and Absorption of Coarse Aggregate.
.2	CAL. 229	Test Method for Durability Index.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.2-M Sieves, Testing, Woven Wire, Metric.

.5 Canadian Standards Association (CSA)

.1 CAN/CSA–A23.1/A23.2 Concrete Materials and Methods of Concrete Construction.

1.4 SUBMITTALS

.1 Submit source quality control test results 15 days prior to delivery of materials to site. Present results as log scale gradation curve with specified gradation curves included.

1.5 QUALITY ASSURANCE

.1 Conduct quality control tests at the source to confirm that materials meet the specified gradation and durability requirements.

.2 The Departmental Representative may perform testing during the course of the Work and prior to acceptance. Provide assistance to the Departmental Representative in conducting the following quality assurance testing:

.1 Load a 7 m^3 sample of each class of riprap, selected by the Departmental Representative, and transport to the on-Site test location as designated by the Departmental Representative. Weigh selected boulders from the sample to establish reference sizes for sorting. Sort all of the boulders in the sample into similar weight groups, and spread each weight group in a single row. The Departmental Representative will count the number of boulders in each weight group, compute the effective particle size (D_e) and weight for each group, and determine the gradation for the sample.

.2 Provide a weigh scale capable of weighing each boulder individually. Calibrate the weigh scale at the start of the riprap placement operations, or as required by the Departmental Representative.

.3 Provide all necessary labour and equipment to load, weigh, sort and spread the riprap samples.

.4 If the tested riprap sample meets the specifications, incorporate the riprap in the Work at a location designated by the Departmental Representative for reference purposes.

.4 The Departmental Representative may take samples of riprap bedding gravel for quality assurance testing. Cooperate with the Departmental Representative during testing.

.5 The Departmental Representative may reject riprap and riprap bedding gravel at the source, in the transport vehicle, in the stockpile, or in place.

PART 2 PRODUCTS

2.1 MATERIALS

Provide materials in accordance with the following.

1. Pitrun Gravel:
    1. Reasonably well graded gravel and sand with the following gradation:

Sieve Size	Percent Passing by Mass
80 mm	100%
50 mm	55% – 100%
25 mm	38% – 100%
16 mm	32% - 85%
5 mm	20% – 65%
315µm	6% - 30%
80µm	2% – 10%

    2. Less than 12% loss of weight after 5 cycles in accordance with the requirements of CAN/CSA A23.2–9A.
2. Riprap Bedding Gravel:
    1. Well graded sand, gravel, and cobbles with the following gradation:

Sieve Size	Percent Passing by Mass
150 mm	100%
75 mm	70% – 100%
40 mm	50% – 80%
20 mm	36% – 65%
10 mm	25% – 55%
5 mm	17% – 45%
2.5 mm	10% – 35%
1.25 mm	6% – 25%
630µm	2% – 15%
315µm	0% – 10%
160µm	0% – 6%
80µm	0% – 3%

    2. Less than 12% loss of weight after 5 cycles in accordance with the requirements of CAN/CSA–A23.2–9A.
3. Riprap
    1. Sound, hard, durable particles free from silt, clay, shale, sandstone, flaky particles, topsoil, organic matter, and other deleterious materials.
    2. Apparent specific gravity not less than 2.60 as determined by CAL. 206.
    3. Absorption not greater than 2% as determined by CAL. 206.
    4. Durability Absorption Ratio (DAR), and Durability Index (as determined by CAL. 229) conforming to either of the following minimum requirements:
        i. DAR greater than 23.
        ii. DAR not less than 10 and Durability Index not less than 52.
    5. Ratio of maximum dimension to minimum dimension of individual pieces not to exceed 3.0.

6. Riprap Class 1M:

    i. With the following gradation:

Effective Particle Size	Percent Passing by Mass
300 mm	100%
200 mm	30% – 70%
175 mm	20% – 50%
125 mm	0%

7. Riprap Class 1:

    i. With the following gradation:

Effective Particle Size	Percent Passing by Mass
450 mm	100%
350 mm	50% – 90%
300 mm	20% – 50%
200 mm	0%

4. Department Supplied Riprap:

1. The Department has a stockpile of riprap adjacent to the reservoir and will provide sufficient quantity for placement in the reservoir around the gatewell. The Contractor is responsible for cleaning by use of a Grizzly at the stockpile, loading, transporting to site and placement around the gatewell at the direction of the Departmental Representative.

PART 3 EXECUTION

3.1 STOCKPILES

.1 Obtain prior authorization from the Departmental Representative for temporary stockpile locations on Site. Do not stockpile riprap or granular materials in areas where contamination with the underlying soils can occur. Prepare stockpile areas by grading the area level, and diverting drainage from adjacent areas away from the stockpile locations.

.2 Stockpile riprap and granular materials in a manner that minimizes segregation.

3.2 PLACEMENT

.1 Place granular materials and riprap at the locations, and to the lines, grades, and elevations specified in the Contract Documents.

.2 Surfaces to receive granular materials and riprap may be frozen, but remove water, snow, ice, frozen lumps, and other deleterious materials from receiving surfaces.

.3 Do not place granular materials and riprap until the receiving surfaces have been inspected by the Departmental Representative. Rectify defects, including any identified by the Departmental Representative, until the receiving surfaces meet the requirements of the Contract Documents.

.4 Place granular materials and riprap by clam shell, dragline, backhoe, or similar lifting equipment. Do not end-dump and push material into place on the slopes.

.5 Do not cause segregation, particle damage, breakdown, or excessive displacement of the previously placed material. Replace or repair damaged or displaced material.

.6 Obtain the specified distribution of the various sizes of particles throughout the mass by using selective loading at the source or stockpile, by controlled dumping of successive loads during placing, or by other methods of placement.

.7 Commence placement of granular materials and riprap from the toe of the slope and proceed up the slope.

.8 Place granular materials and riprap to its full thickness in one operation.

.9 Place riprap in a closely packed arrangement such that smaller rocks fill the voids between larger rocks and there are no unfilled spaces that would permit the escape of underlying layers of placed materials. Interlock particles and dress slopes as required.

.10 Rearrange rocks to eliminate any tendency of the rocks to move or slide after placement.

.11 Do not allow equipment to travel upon riprap and riprap bedding.

.13 Provide a completed riprap surface that is smooth, regular, and uniform.

3.3 PLACEMENT TOLERANCES

.1 Place riprap bedding within a tolerance of +50 mm of the specified thickness and within a tolerance of +100 mm of the specified elevation.

.2 Place riprap to within a tolerance of +100 mm of the specified thickness and within a tolerance of +100 mm of the specified elevation.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 Drawing G-0001: Typical Chain Link Fence. Attached to specification.

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A 53/A 53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A 90/A 90M, Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
- .3 ASTM A 121, Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
- .4 A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM F 1664, Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.

.3 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-138.1, Fabric for Chain Link Fence.
- .2 CAN/CGSB-138.2, Steel Framework for Chain Link Fence.
- .3 CAN/CGSB-138.3, Installation of Chain Link Fence.
- .4 CAN/CGSB-138.4, Gates for Chain Link Fence.
- .5 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.

.4 Canadian Standards Association (CSA International).
- .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-A3000, Cementitious Materials Compendium. Includes:
- .4 CAN/CSA-A23.5, Supplementary Cementing Materials

2 PRODUCTS

2.01 MATERIALS

.1 Chain-link fence fabric: to CAN/CGSB-138.1.
- .1 3.55 mm diameter, 50 mm x 50 mm diamond mesh, zinc coated steel wire in accordance with ASTM A392.
- .2 Height of fabric: 1.8 m.

.2 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Size and dimensions as indicated on drawing.

.3 Tension wire: to CAN/CGSB-138.2, single strand, 5 mm diameter galvanized steel wire.

.4 Tie wire fasteners: aluminum wire.

.5 Tension bar: to ASTM A 653/A 653M, 5 x 20 mm minimum galvanized steel.

.6 Gates: to CAN/CGSB-138.4.

.7 Gate frames: to ASTM A 53/A 53M, galvanized steel pipe, standard weight 42 mm outside diameter pipe for outside frame, 33 mm outside diameter pipe for interior bracing.
- .1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanize after welding.
- .2 Fasten fence fabric to gate with twisted selvedge at top.

.3 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.
.4 Furnish double gates with chain hook to hold gates open and centre rest with drop bolt for closed position.

.8 Fittings and hardware: to CAN/CGSB-138.2, cast aluminum alloy or galvanized steel.
.1 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.
.2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.
.3 Overhang tops to provide waterproof fit, to hold top rails and an outward projection to hold barbed wire overhang.
.4 Provide projection with clips or recesses to hold 3 strands of barbed wire spaced 100 mm apart.
.5 Projection of approximately 300 mm long to project from fence at 45 degrees above horizontal.
.6 Turnbuckles to be drop forged.

.9 Organic zinc rich coating: to CAN/CGSB-1.181.

.10 Barbed wire: to CAN/CGSB-138.2, 2.5 mm diameter.

.11 Grounding rod: 16 mm diameter copperwell rod.

2.02 FINISHES

.1 Galvanizing:
.1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.
.2 For pipe: 550 g/m² minimum to ASTM A 90.
.3 For barbed wire: to ASTM A 121, Class 2.
.4 For other fittings: to CAN/CSA-G164.

3 EXECUTION

3.01 ERECTION OF FENCE

.1 Erect fence along lines as indicated and to CAN/CGSB-138.3.

.2 Install end posts at end of fence.
.1 Install gate posts on both sides of gate openings.

.3 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface] [at inclination as indicated].
.1 Install braces on both sides of corner and straining posts in similar manner.

.4 Install overhang tops and caps.

.5 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.

.6 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.

.7 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals.
.1 Knuckled selvedge at bottom.
.2 Twisted selvedge at top.

.8 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals.
.1 Give tie wires minimum two twists.

.9 Install barbed wire strands and clip securely to lugs of each projection.

.10 Install grounding rods as indicated.

3.02 INSTALLATION OF GATES

.1 Install gates in locations as indicated.

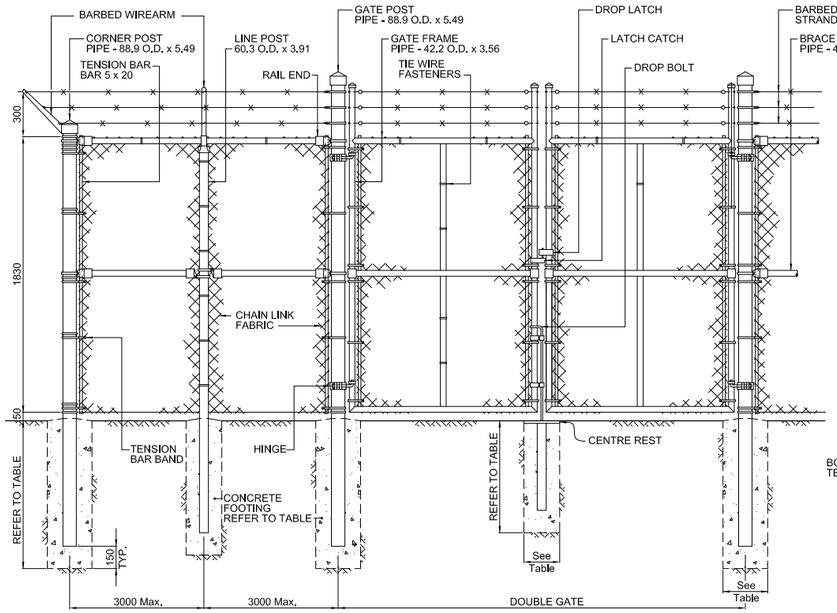
.2 Determine position of centre gate rest for double gate.
.1 Cast gate rest in concrete as directed.

.3 Install gate stops where indicated.

3.03 TOUCH UP

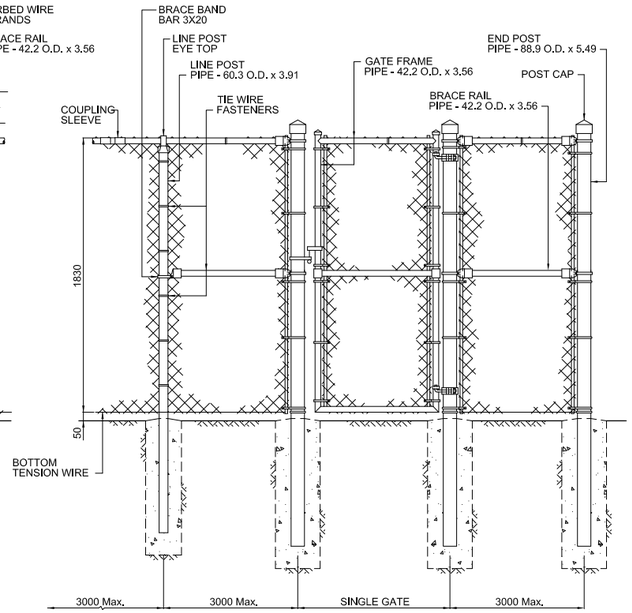
.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas.
.1 Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

END OF SECTION



DOUBLE GATE FENCE DETAIL

Scale 1:20 mm



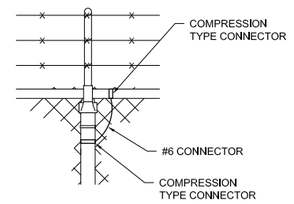
SINGLE GATE FENCE DETAIL

Scale 1:20 mm

NOTES

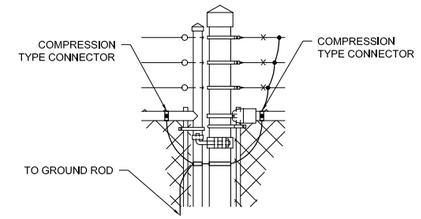
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

HEIGHT OF CHAIN LINK FABRIC	DEPTH OF HOLE		DIA. OF HOLE	
	TERMINAL	LINE	TERMINAL	LINE
1830	1200	1000	300	250



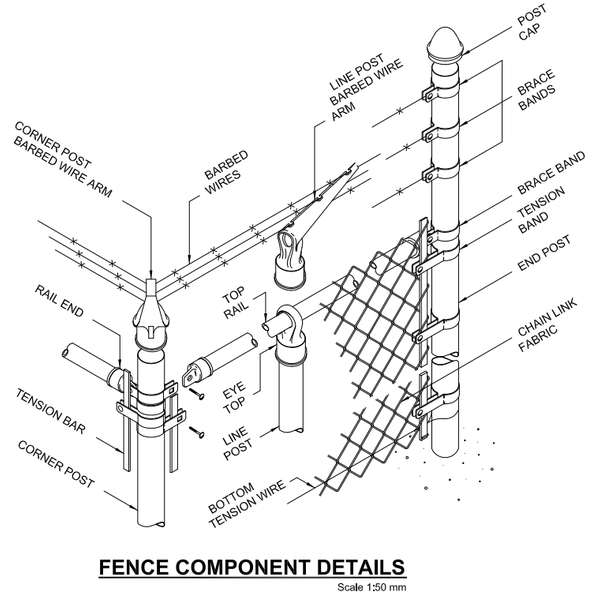
POST AND RAIL DETAIL

Scale 1:12.5 mm



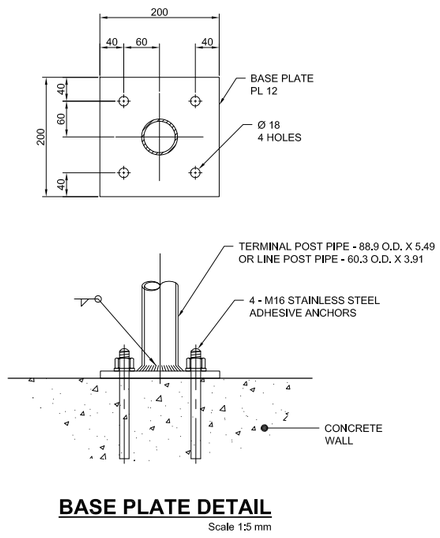
GATE BONDING DETAIL

Scale 1:12.5 mm



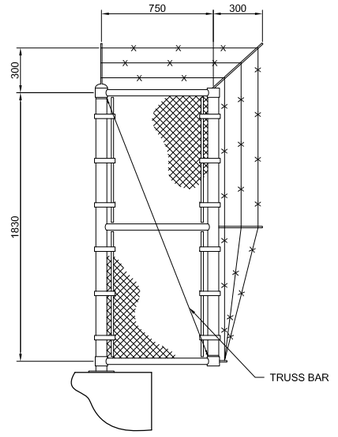
FENCE COMPONENT DETAILS

Scale 1:50 mm



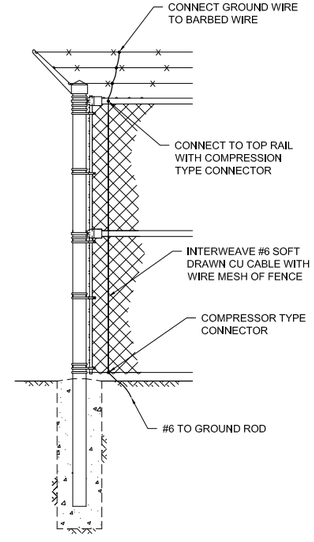
BASE PLATE DETAIL

Scale 1:5 mm



TYPICAL FENCE OVERHANG DETAIL

Scale 1:20 mm



FENCE GROUND DETAIL

Scale 1:20 mm

File Name: P:\Water Resources\PROJECTS\CW2184 Highfield Dam\400 - Work In Progress\440 Water\445 CAD\1 Deliverables\1 Drawings\CW2184_DWG_01-G-0001.dwg Saved By: Vanguiz, Dale Plot Date: 140620 12:10 PM

Scale

0 1250 2500 mm 1:50
0 312.5 625 mm 1:12.5
0 500 1000 mm 1:20
0 125 250 mm 1:5

This document may have been reduced. Do not scale this document. All measurements must be obtained from stated dimensions.

Professional Authentication

REV	YY	MM	DD	ISSUE/REVISION DESCRIPTION	DRN	CHK	DES	REV
A	00	00	00	ISSUED FOR				

Client: AGRICULTURE AND AGRI-FOOD CANADA

Project Name: HIGHFIELD DAM
REAHBILITATION OF WEST LOW LEVEL OUTLET

Sheet Title: TYPICAL CHAIN LINK FENCE

Project Number: CW2184

Drawing Number: G-0001

Issue/Revision: A

1 GENERAL

1.01 WORK INCLUDED

.1 Seeding of Waste Fill areas upon completion.

1.02 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide product data for:
- .1 Seed.
- .2 Fertilizer.

1.03 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.04 WASTE MANAGEMENT AND DISPOSAL

.1 Do not dispose of unused fertilizer into reservoir, streams, on to ground or in locations where it will pose health or environmental hazard.

2 PRODUCTS

2.01 GRASS SEED

.1 Common No. 1 grade seed in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
- .1 Agronomic seed mixture
  - .1 40.0% by weight Pubescent Wheat Grass
  - .2 30.0% by weight Dahurian Wild Rye
  - .3 30.0% by weight Sheep Fescue

.2 In packages individually labeled in accordance with "Seeds Regulations" and indicating name of supplier.

2.02 WATER

.1 Free of impurities that would inhibit germination and growth.

2.03 FERTILIZER

.1 Do not apply fertilizer where native seed mixes are applied.

.2 To Canada "Fertilizers Act" and "Fertilizers Regulations".

.3 Complete synthetic fertilizer with guaranteed minimum analysis as specified.
- .1 16 Nitrogen
- .2 20 Phosphates
- .3 0 Potash

.4 Compatible with seed mix composition and soil conditions.

3 EXECUTION

3.01 PREPARATION

.1 Do not perform work under adverse weather and field conditions as determined by Departmental Representative.

.2 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials as directed by Departmental Representative.

3.02 APPLICATION

.1 Use equipment and method acceptable to Departmental Representative such as mechanical landscape seeder which accurately places seed at specified depth and rate and rolls in single operation.

.2 Apply seed mix composition at a rate of 85 kg/hectare.

.3 Apply fertilizer at a rate of 150 kg/hectare.

.4 Sow half of required amount of seed in one direction and remainder at right angles as applicable.

.5 Blend applications 300 mm into adjacent vegetated areas to form uniform surfaces.

.6 Incorporate seed by light raking in cross directions.

.7 Consolidate mechanically seeded areas by rolling area with approved equipment immediately after seeding if soil conditions warrant or if directed by Departmental Representative.

.8 Water the seeded area to achieve germination and a uniform stand of grass. Apply water uniformly without causing displacement or erosion of the materials or soil. Use watering equipment and techniques approved by Departmental Representative.

3.03 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of seed application until acceptance by Departmental Representative:
- .1 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
- .2 Repair and reseed dead or bare spots greater than 1 m^2 in size to allow establishment of seed prior to acceptance.
- .3 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.

3.04 FINAL ACCEPTANCE

.1 Seeded areas will be accepted by Departmental Representative provided that:
- .1 Areas are uniformly established and turf is free of rutted, eroded, bare or dead spots and free of weeds.
- .2 Areas have been fertilized.

.2 Areas seeded in fall will be accepted in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA)

.1 ANSI/AWWA C207, Steel Pipe Flanges for Waterworks Service, 4 Inch through 144 Inch (100 mm through 3,600 mm).

.2 ANSI/AWWA C906, Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission.

.2 American Society for Testing and Materials International, (ASTM)

.1 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

.2 ASTM D 3350, Standard Specification for Polyethylene Plastic Pipe and Fittings Material.

.3 ASTM D 3261, Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene Plastic Pipe and Tubing.

.4 ASTM F 2206, Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock.

1.02 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Pipe certification to be on pipe.

1.03 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of waste materials at appropriate recycling or disposal facilities.

.2 Handle and dispose of any hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

2 PRODUCTS

2.01 PIPE AND FITTINGS

.1 Polyethylene pressure pipe: PE4710 DR 21 in diameters and lengths as indicated on the drawings. Pipe joints to be thermal butt fused to ASTM D 2657.

.2 Flexible Restraints: EF Flexible bar restraint for electro-fusion to pipe, 200 mm x 40 mm x 65 mm. Axial load capacity 3200 kg minimum. Approved manufacturers; TEGA, Plasson, Georg Fischer.

.3 Steel Flanges: AWWA C207 Class B stainless steel flange.

.4 Blind Flanges and Rubber Gasket: HDPE blind flange capable of providing a water tight seal at 20 psi and compatible with pipe material. Alternate: stainless steel blind flange with rubber gasket.

3 EXECUTION

3.01 PREPARATION

.1 Clean pipe and fittings before installation and encasement.

.1 Inspect materials for defects to approval of Departmental Representative.

.2 Replace or repair as directed by Departmental Representative. Remove and dispose defective materials from site as directed.

3.02 PIPE INSTALLATION

.1 Install HDPE liner pipes true to line and grade.

.2 Handle pipe using methods recommended by pipe manufacturer.

.3 Position pipe with equipment and methods approved by Departmental Representative.

.4 Keep installed pipe free of dirt and other foreign materials.

3.03 ENCASEMENT

.1 Upon completion of pipe installation and after Departmental Representative has inspected Work in place, grout or encase pipes as indicated in other Sections.

.2 Do grouting and concrete encasement work in accordance with other Sections and approved work procedures approved by Departmental Representative.

.3 Ensure HDPE liner pipe is properly restrained, anchored or weighted to prevent flotation during the grouting or concrete encasement operation.

END OF SECTION

1 GENERAL

1.01 WORK INCLUDED

.1 Work includes all materials, means and methods required to install the HDPE liner pipe in the upstream and downstream conduits. Work items generally include:

- .1 Environmental protection measures;
- .2 Underwater cleaning and preparing the upstream concrete conduit;
- .3 Underwater slip lining of the upstream conduit with HDPE pipe;
- .4 Underwater installation of watertight bulkheads, concrete plug and pipe blind flange at the upstream end;
- .5 Restraining and temporary measures required to prevent movement and floatation of the HDPE pipe during grouting;
- .6 Dewatering of the upstream conduit and gatewell;
- .7 Low pressure pump/pressure grouting of the void space between the concrete conduit and the HDPE liner pipe;
- .8 Cleaning and preparing the downstream concrete conduit and outlet basin;
- .9 Slip lining of the downstream conduit and outlet basin with HDPE pipe;
- .10 Installing the HDPE liner pipe;
- .11 Restraining and temporary measures required to prevent movement and floatation of the HDPE pipe during grouting;
- .12 Watertight forms and bulkheads;
- .13 Low pressure pump/pressure grouting of the void space between the concrete conduit and the HDPE liner pipe;
- .14 Reinforced cast-in-place concrete and mass concrete encasement of the liner pipe in the outlet basin;
- .15 Clean up;
- .16 Return trip and dive to remove blind flange on upstream HDPE pipe prior to operating season.

1.02 REFERENCES

.1 American Society for Testing and Materials (ASTM)

- .1 ASTM C 109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
- .2 ASTM C 495, Standard Test Method for Compressive Strength of Lightweight Insulating Concrete.
- .3 ASTM C 796, Standard Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam.
- .4 ASTM C 869, Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete.
- .5 ASTM C 882, Standard Test Method for Bond Strength of Epoxy Resin Systems Used with Concrete by Slant Shear.

.2 Canadian Standards Association (CSA International)

- .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .2 CAN/CSA A3001, Cementitious Materials for Use in Concrete.

1.03 QUALIFICATIONS

.1 The grouting (cellular concrete) sub-contractor shall be certified by the manufacturer of the foaming agent, capable of developing mix designs, batching, mixing, handling and placing cellular concrete. The sub-contractor shall be experienced and regularly engaged in the production and placement of cellular concrete, slip lining and similar installations.

1.04 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit Qualifications of grouting sub-contractor to Departmental Representative for approval.

.3 Submit proposed work plan methodology including;
- .1 Environmental protection plan.
- .2 Cleaning and preparing existing concrete conduit.
- .3 Installation of HDPE liner c/w displacement restraint system and water tight bulkheads.
- .4 Low pressure (pump) grouting procedure and quality monitoring instrumentation and measures

1.05 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of waste materials at appropriate facilities.

.2 Handle and dispose of any hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

2 PRODUCTS

2.01 MATERIALS

.1 Lightweight Cellular Concrete for grouting of annular space between conduit and liner;
- .1 Portland cement and supplementary cementitious materials in conformance with CSA A3001.
- .2 Potable water free of deleterious acids, alkali, salts, oils and organic materials conforming to CSA A23.1.
- .3 Admixtures proposed by mix designer to be reviewed by Departmental Representative.
- .4 Foaming agent conforming to ASTM C869.
- .5 Wet Cast Density 800 kg/m^3 (50 pcf) minimum.
- .6 Compressive strength: 0.7 MPa (100 psi) in 24 hours, 2.1 MPa (300 psi) in 28 days.

.2 Concrete materials: to Section 03 30 00.01 - Cast-in-Place Concrete.

3 EXECUTION

3.01 PREPARATION

.1 Clean existing concrete conduit surfaces and remove sediment prior to grouting or concrete placement.
- .1 Environmental plan to prevent reservoir contamination from cleaning operation. Contain or remove sediment and cleaning debris by use of dredging equipment or other approved means.
- .2 Use water jets, mechanical scrapers or other means to remove biological growth, laitance or other contaminants from existing concrete surfaces.
- .3 Existing concrete surfaces to be clean, sound and roughened to ensure good bond.

.2 Provide minimum 48 hours notice to Departmental Representative prior to placing concrete or grout.

3.02 INSTALLATION

.1 Install HDPE liner pipe, pressure sensors, instrumentation leads, and bulkheads in existing conduit.

.2 Ensure HDPE liner is secured in position prior to commencement of grouting operation. Provide and install measures approved by Departmental Representative to prevent flotation and keep HDPE pipe in proper alignment and on grade during grouting. Such measures could include, but are not limited to; casing spacers, additional temporary blind flanges on HDPE pipe enabling it to be water filled during grouting.

.3 Provide and install grouting pipes/hoses in annular space and/or grout ports with valves in HDPE pipe as required by approved work plan.

.4 Annular space to be drained and free of water prior to grouting operation. Operate any required dewatering systems and equipment until grouting operation is complete.

.5 Perform grouting operation in accordance with grout manufacturer's instructions and work plan approved by Departmental Representative. Pump grout in continuous operation, progressing from one end to the other through successive grout ports.

.6 Monitor and record progress of grouting both visually and with pressure readings to ensure complete filling of the void between the conduit and HDPE liner pipe.

.7 Do concrete work in accordance with Section 03 30 00.01 - CIP Concrete and to CAN/CSA-A23.1/A23.2.

3.03 TESTING

.1 Density: Measure and record fresh cellular concrete density the most frequent of once per production run, once for every 50 m^3, or once every 20 minutes. Adjust mix as necessary to maintain production density within 10% of design density.

.2 Compressive Strength: Test cellular concrete in accordance with ASTM C495. Take 3 cylinder samples for upstream conduit and 3 for the downstream conduit. Cylinders to be 3"x6" plastic molds. Cover cylinders after casting to prevent damage and loss of moisture. Do not oven dry samples.

3.04 CLEANING

.1 No hardened grout permitted in the HDPE pipe after completion of grouting operations.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 ASTM International Inc.
- .1 ASTM A 240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .2 ASTM A 276, Standard Specifications for Stainless Steel Bars and Shapes.
- .3 ASTM B 584, Standard Specification for Copper Alloy Sand Castings for General Applications.
- .4 ASTM D 2000, Standard Classification System for Rubber Products in Automotive Applications.
- .5 ASTM D 4020, Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials.

.2 American Water Works Association (AWWA)
- .1 C 561 Fabricated Stainless Steel Slide Gates.

1.02 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:
- .1 Submit certified drawings and material specifications showing dimensions, construction and materials.
- .2 Drawings indicating details and information necessary for assembly and installation purposes including:
  - .1 Description of methods.
  - .2 Sequence of installation.
  - .3 Type of installation equipment required.
  - .4 Temporary bracings and supports.

.3 Shop testing: Submit results of performance tests including gate assembly functionality and leakage test.

.4 Certificate of Proper Installation: to be provided by the gate installation specialist.

.5 O&M Manual: Submit an Operation and Maintenance Manual. Include manufacturer’s drawings, installation, operation and servicing information. Provide a comprehensive, detailed parts and components list.

1.03 QUALITY ASSURANCE

.1 All gates to be the product of a single, applicably experienced, manufacturer.

.2 Manufacturer to be ISO 9001 certified.

.3 Provide the services of a qualified gate and hoist system installation specialist sub-contractor (manufacturer’s representative) to supervise the installation, testing and commissioning of the equipment.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Products and Execution.

.2 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.

2 PRODUCTS

2.01 GENERAL

.1 Gates and operators to be supplied with all necessary components required for a complete, properly operating installation.

.2 Except as modified herein, gates and operators to be in accordance with requirements of AWWA C561.

.3 Size: 1220 mm wide x 1220 mm high square as shown on the drawings.

.4 Design Head:
- .1 Seating Head: 6.1 metres.
- .2 Un-seating Head: 2 metres.

.5 Operating Head 4 metres:

.6 Leakage: not to exceed 0.6 litres/minute/metre of seating perimeter under seating head conditions.

2.02 GATE

.1 Type: Open, non-self contained.

.2 Mounting Plate: Stainless steel plate, 1800 mm wide x 2500 mm high x 25 mm thick with 1220 mm diameter round opening to match inner diameter of HDPE liner pipe. Plate to be provided with bolt holes for attachment to concrete wall around the perimeter of the existing 1524 mm x 1524 mm conduit opening with drill-in adhesive anchor bolts.

.3 Frame: Rigid, one-piece frame. Flange back design suitable for mounting on stainless steel mounting plate. Guide slot to be constructed of ultra high molecular weight polyethylene. Closure to be flush bottom type.

.4 Slide: Reinforced flat plate design. Deflection not to exceed 1/720 of gate span at the design head.

.5 Guides and Seal: Side and top seals to be constructed of ultra high molecular weight polyethylene. Bottom seal to be constructed of resilient neoprene. Sealing system shall only allow water flow in the opened part of the gate.

2.03 OPERATOR AND STEM

.1 Operator Type: Manual, Pedestal mounted; crank operated; rising stem, metal or polycarbonate stem cover with position indicator; gears and bearings enclosed in weather proof cast aluminum housing.

.2 Stem: Solid stainless steel shaft with machine cut threads. Provide stop collar to prevent over closing of the gate.

.3 Couplings: Solid couplings of greater strength than the stem.

.4 Support Bracket: Provide wall mount stainless steel support bracket.

.5 Stem Guides: Stainless steel with UHMWPE bushing. Provide adjustable, wall mounted guide brackets as required for stem design. Guides to be spaced according to manufacturer’s recommendation such that stem slenderness ratio (l/r) < 200.

3 EXECUTION

3.01 GENERAL

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Departmental Representative for direction before commencing fabrication.

.2 Manufacturer's Instructions: comply with manufacturer's shop drawings and written instructions, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.02 INSTALLATION

.1 Installation specialist sub-contractor (manufacturer’s representative) to supervise the installation, testing and commissioning of the equipment.

.2 Install slide gate in completely assembled condition and in accordance with approved installation drawings.

.3 Support slide gate in positions free from distortion and strain on appurtenances during handling and installation.

.4 Ensure mounting plate is true and level in all directions before final tightening of anchor bolts and grouting around perimeter.

.5 Clean out debris and foreign material from gate opening and seats. Ensure proper gate alignment and setting of gate invert.

.6 Anchor hoist/floor stand operator support bracket and stem guides in true alignment.

.7 Test operating mechanisms to ensure proper functioning. Adjust as necessary.

3.03 FIELD TEST

.1 Installation specialist to conduct dry and wet testing of the completed installation in the presence of Departmental Representative.

.2 Operate gates through at least two complete open/close cycles.

.3 Conduct field leakage test.

.4 If necessary, correct and adjust gate and hoist installation until operation is within specified parameters.

3.04 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION