

**APPENDIX D**  
**CONSTRUCTION PLAN**



**SOUTH END SEWAGE TREATMENT PLANT (SEWPCC)  
PRIMARY CLARIFIER TRAVELLING BRIDGES  
CONSTRUCTION PLAN  
S1074-00DD-PLA-0001**

FINAL

August 2018

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## TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	PROJECT CONTACT PERSONNEL.....	3
3.0	CONSTRUCTION SCHEDULE OVERVIEW .....	4
4.0	PRIMARY CLARIFIER NO.3 SHUTDOWN .....	6
4.1	CITY HANDOVER TO CONTRACTOR.....	6
4.2	DISASSEMBLY AND DEMOLITION .....	7
4.3	MECHANICAL - INSTALL CITY SUPPLIED PARTS.....	8
4.3.1	Rail and Cog Track Installation .....	8
4.3.2	Mechanical Refurbishment.....	9
4.3.3	Electrical/Control Works.....	11
4.4	STRUCTURAL WORKS .....	11
4.5	COMMISSIONING AND HANDOVER TO CITY.....	11
5.0	PRIMARY CLARIFIER NO. 1 & 2 SHUTDOWN.....	12

## LIST OF APPENDICES

- A Project Schedule
- B Contact Information Table
- C Suggested Sequence of Work

## 1.0 INTRODUCTION

The South End Sewage Treatment Plant (SEWPCC) is the second largest of the three (3) sewage treatment plants servicing the City of Winnipeg. The SEWPCC is located at 100 Ed Spencer Drive in Winnipeg, Manitoba. The SEWPCC has three (3) existing rectangular clarifiers that are used to provide for the initial primary treatment of the wastewater after grit removal and screening. Each primary clarifier generally consists of a rectangular concrete tank equipped with a travelling bridge mechanism to collect the sludge at the bottom of the tanks as well as the scum that floats at the surface. The three tanks are located to the west of the existing grit building. Each travelling bridge has a reversing motor mounted on the bridge for moving the unit back and forth in an east-west direction. The drive motor on Primary Clarifier Travelling Bridge No. 3 has two speeds for the west direction of travel. Each bridge mechanism is controlled from a local control panel mounted directly on the travelling bridge.

Primary Clarifier Travelling Bridge 1 and 2, each with a span of approximately ten (10) meters, were manufactured by Walker Process Equipment and installed in 1971 with some rehabilitation work undertaken approximately fifteen years ago. Primary Clarifier Travelling Bridge 3, with a span of approximately twenty (20) meters, was manufactured by Dorr-Oliver Canada Ltd. and installed as part of a plant expansion in 1992. Plant operations staff have expressed concern over the number of travelling bridge components that are failing. The local control panels were installed in 1992 and require significant ongoing maintenance.

Reliable operation of the primary clarifier system is critical to the operation of the plant. The City has determined that the electrical, and automation components on each primary clarifier travelling bridge and the mechanical components on primary clarifier travelling bridge 3 require replacement based on previous asset condition assessments, the functional requirements of the assets, general observations, and/or the vintage of the assets.

The three primary clarifier travelling bridges will be undergoing a shutdown starting in fall 2018. Work must be completed before spring conditions increase flow to the plant. During the shutdown electrical and control works will have to be done to all three clarifiers. Minor structural works will be required to clarifier bridge 3, with minor paint works on 1, 2 and 3, and mechanical works to the clarifier drive system only for clarifier 3. This construction plan describes the steps

involved in completing the work. It is not intended to describe the work in detail, nor does it address quality control measures any further than is needed to understand the associated scheduled time for a task.

This plan will also indicate who the project personnel are and what the communication links between them will be. Then a project outline schedule is presented to indicate the timeframes available to complete the work. This document is separated into two sections: The first describes the proposed work sequence for the electrical, structural, and mechanical work planned for clarifier 3. Each section discusses the steps involved in the work planned. The construction plan also discusses the methods to be used to minimize the risk to the project schedule posed by unpredictable weather and the ongoing work at the South End treatment plant.

## 2.0 PROJECT CONTACT PERSONNEL

Communication for the project will be between various City, KGS Group, and contractor personnel. A clear plan for lines of communication is required. Following are guidelines that should apply.

1. The contractor should request clarifications from KGS. KGS will review any issues with the City and advise the contractor as to how to proceed. The contractor may contact individual engineers at KGS via email, but the KGS project manager must be copied.
2. KGS may contact various personnel at the City, but the City's project manager must be copied on correspondence.
3. Should issues arise related to the C4 contract currently underway on-site, the City will advise this project how best to proceed

A table of contact persons and their information is provided in Appendix B.

### 3.0 CONSTRUCTION SCHEDULE OVERVIEW

The project schedule currently indicates the construction contract award is scheduled for the 2<sup>nd</sup> of November, 2018 (see Appendix A). The clarifier shutdowns required for contract work to be completed are planned to occur during the winter season when sewage flows are lower. The winter season typically can start as early as September and ends as late as March. However, this cannot be predicted accurately. Therefore, the work must be planned to best exploit the available time. This will allow for the largest possible time contingency to prevent work running into the March/April time frame.

As per the project schedule, clarifier No.3 must be shutdown first as it requires the most refurbishment work and is at a higher risk of breakdown than 1 and 2. Time from contract award to clarifier shutdown will be required for the contractor to prepare, submit shop drawings for and procure materials. The contractor will also have to inspect and accept mechanical materials purchased by the City to upgrade clarifier 3. As soon as he is ready to proceed with clarifier shutdown, he shall give 5 days' notice to permit the City to prepare.

The shutdown of clarifier No.3 is planned to start in early December. Once the structural, mechanical, electrical, and control work is finished, commissioning of the bridge collector will be carried out. Commissioning activities will center around the electrical and control works. Commissioning requirements will be presented in the Commissioning Report to be attached in Appendix D when completed.

Once clarifier 3 is back in operation and deemed acceptable to turn over to the City, clarifier 2 can be shutdown. A key component of this project schedule will be delivery of Ovivo mechanical materials required to upgrade clarifier 3. The package 1 and 2 materials purchased by the City will be shipped to Winnipeg upon approval by the City.

Processing shop drawings and construction of the contractor supplied clarifier control panels may take 4 weeks. With the contract awarded in early November, and work starting in early December, this leaves as estimated one month in November for preparation of and approval of shop drawings.

Some electrical and control systems work can be completed without shutting down the clarifier. For example, wall mounting the land based remote I/O panels can be done earlier. Similarly, the mobilization and demobilization of the contractor's team will not require the clarifier to be shut down. This includes unloading the City supplied Ovivo parts, setting up a storage area outside the building, carrying out inspections on those parts, unloading and setting up equipment, and completing safety orientation. All of the same demobilization activities can be done after the clarifiers are turned over to the City.

The mechanical specification requires the contractor to provide Quality Control (QC) methodology documents to the contract administrator for the rails and bridge drive system work. In addition to this, there are two Inspection and Test Plans (ITP), one for the rails and anchor bolts, and the other is for the bridge drive system. Additionally, there are two QC checklists provided to the contractor in the specification that are required by the ITPs. Each stage of the ITP document requires signoff by the contractor, the OEM representative, and the contract administrator in order to continue with the next step. As such the contractor must coordinate the ITP signoff with the contract administrator.

## **4.0 PRIMARY CLARIFIER NO.3 SHUTDOWN**

This section lists the steps involved in completing primarily the mechanical refurbishment work on this clarifier. While the mechanical works are underway, the minor structural weld repair work and the electrical/control system replacement can proceed in parallel. It should not be difficult for the structural and electrical control works to be completed well within the time required to complete the mechanical works.

Some of these works should be completed early in the clarifier shutdown period while the mechanical work is involved in demolition of the rails, etc. It would be best if the structural and electrical/control works were complete when the new rails and drive shafts are installed as very accurate alignment work will be underway. Walking on the bridge while some of these activities are underway will be very limited.

A detailed suggested listing of mechanical work is included in Appendix C to assist the contractor in defining the work required. Another work sequence will be acceptable if accepted by the Contract Administrator.

### **4.1 CITY HANDOVER TO CONTRACTOR**

In order to cut off flow to and from the clarifier, the City operations personnel will divert flow from this clarifier, drain its contents and prepare the clarifier for turnover to the contractor.

After the clarifier is shutdown, the contractor can remove the scraper arm and place it at the bottom of the cleaned clarifier. This will create useful work space at the west end of the building. The bridge will then be placed in the service area on the west side. Then the City will disconnect and lockout power and controls for the bridge. The contractor will also lock-out and tag the same electrical breaker switches. The clarifier will then be turned over to the contractor for him to complete his work.

## 4.2 DISASSEMBLY AND DEMOLITION

The Contractor should have their equipment set-up and ready to start work prior to clarifier shutdown and turnover. Following is a listing of tasks involved in this section of project work. Work on the bridge rails and the drive shaft system can be completed concurrently. Following is a listing of tasks envisioned for each:

### Drive Shaft System Demolition

- Lift the bridge collector off the rails and place it on supporting blocks.
- Unbolt the couplings and pillow blocks on the wheel and cogwheel axles.
- Once disconnected, the running wheel axle assemblies and the cogwheel axle assemblies can each be carefully lowered onto a dolly, labelled, inspected, photographed, packaged, and stored in the event they are required for re-use. Concurrently with this work, the chain guard assembly oil can be drained and disposed of off-site.
- Once the chain guard assembly is drained it may be disassembled, and 120-2 92 pitch length drive chain can then be removed. Each of the disassembled pieces should be processed for storage in the same way as the axle assemblies including all fasteners, seals and other small miscellaneous parts.
- Remove the 120-2 20 tooth sprocket from the gearbox output shaft and process it for storage.
- Unbolt and lower the four sections of the main drive axle onto a dolly and process and ship to the Contractor's shop for machining and measurement.
- Remove the remaining pillow block bases, tops, and any other miscellaneous items - label, and store.
- Coordinate Signoff of the ITP with the contract administrator to proceed with installation of the City supplied parts.

### Rail System Demolition

- Unbolt, cut and dispose of the running rails and cog track.
- Remove the sole plates, neoprene pads, and shims.
- Following the removal of the running rail and cog track, chip the grout pads away, cut the anchor bolts. Prepare the area for new bolts and rails.
- Patch the sections of grout that were chipped for the removal of the existing anchor bolts using mortar cement repair mix.

- Coordinate Signoff of the ITP with the contract administrator to proceed with installation of the City supplied parts.

### **4.3 MECHANICAL - INSTALL CITY SUPPLIED PARTS**

Various work activities can occur concurrently to some degree. For example while the shaft sections are being re-assembled in the contractor's shop, weld repairs to the bridge collector structure can be also be completed. However, the alignment of bridge shafts and axles will have to be done when there is no vibration from people walking on the bridge or from nearby pile driving or other similar construction activities.

#### **4.3.1 Rail and Cog Track Installation**

- As stated earlier, the new anchor bolt layout will be designed by the contractor and provided to KGS as a shop drawing for review before the shutdown of the clarifier.
- The locations on the concrete that will be chipped for new grout pads will be surveyed and marked. After the new grout pad locations have been chipped, the new anchor bolt locations can be surveyed and aligned. They shall be installed using the fixed starting point (or datum) shown on drawing L-32983 and the center of the span between the north and south rails as the centerline for the transverse (North/South) alignment. Using the center of the clarifier as the starting point for the installation will ensure that the buildup of misalignment is minimized. Coordinate Signoff of the ITP with the contract administrator before proceed with drilling the holes to insert the anchor bolts.
- The sole plates will be roughly levelled and aligned prior to grouting, however, they will be shimmed to meet elevation and levelness requirements. Coordinate Signoff of the ITP with the contract administrator before proceed with grouting the sole plates.
- Remove the sole plates and re-survey the grout pads. Shim pack heights will be recorded on the same marked up copy of the shop drawing. The neoprene pads can then be applied to the grout pads along with the shim packs. The sole plates will then be placed on top and then re-aligned.
- Align and install the ASCE 40AS running rail and 3/4in thick mild steel cog track pieces using the same datum and centerline as the anchor bolts. Each piece of rail or cog track shall be placed, aligned, measured, and cut/drilled to fit. The cog rail tooth profile must be installed such that it is as precisely in phase with the opposite side as possible. This will progress along each side until the rail has reached the service area, where the installation of these pieces will be coordinated with the work on the bridge collector. Coordinate Signoff of the ITP with the contract administrator.

It is possible that during drilling some issues such as rebar may cause the hole position to be out of tolerance. If this does occur it is important that the resulting misalignment is reported. Once all of the holes have been drilled, the contractor will provide a marked up copy of the original shop drawing showing actual locations of the bolts. The resulting rail misalignment can be accommodated with shims, slotting of bolt holes or other techniques.

#### **4.3.2 Mechanical Refurbishment**

Once the main drive shaft sections have been shipped offsite to the contractor's shop, the mechanical scope will be divided into two concurrent sets of work. The first will be ongoing onsite work on the bridge collector (pre-alignment of the pillow block bases), and the second will be the bearing replacement and shaft measurement at the contractor's shop.

- Upon delivery of the equipment to the contractor's shop, each of the assemblies will be cleaned, inspected, and photographed by the contractor in order to record and report damage or defects. Detailed measurements of the bearing and sprocket positions will be required for re-assembly.
- Remove the FS203 flexible and rigid couplings. Mark the removed couplings with a number/location and set aside for later re-installation. Leaving the 45-tooth sprocket in place, the locking rings on each of the SKF SNH22520 pillow block bearings will be unthreaded allowing the bearings to be removed. The original bearings and couplings will be inspected, photographed, tagged (including location), packaged, and stored. Coordinate Signoff of the ITP with the contract administrator before proceeding with the measurement of the shaft.
- With all of the connecting components removed from the shafts, measure the shafts for concentricity, runout, and other misalignment. Provide a shop drawing showing the measurements taken. Coordinate Signoff of the ITP with the contract administrator before proceeding with re-assembly.
- After the drive shafts have been dimensioned, install the City supplied parts. Position the parts using the measurements taken from the dis-assembly stage. Care should be taken to reverse only the two (2) FS203 flex couplings hubs that connect to the cogwheel axles. The other two (2) flexible hubs that connect to the sprocket shaft must be installed with the geared portion of the hub closer to the middle of the shaft (towards the sprocket).
- Following the re-assembly of the main drive shaft sections, reinstall the new FS203 reversed flexible half couplings on the cogwheel axles. If the wheels and cogwheels are supplied without the bearings installed, these must be installed and rough positioned before installing couplings.

- Meanwhile at the SEWPCC primary clarifier, replace the existing 20 tooth drive sprocket with the new one. This part is a light drive fit and can be pressed on with a hydraulic press.
- Before the newly re-assembled parts are delivered to the site, check the pillow block bolting surfaces on the bridge structure for elevation, translation, and levelness. Using these measurements, build shim packs to keep the main drive shafts within parallel and angular alignment requirements, mark-up drawing as required in ITP. Install the new pillow block bases and check the alignment.
- Following the delivery of equipment from the contractor's shop, the four main drive shaft sections can be installed on the pre-aligned pillow block bases starting with the section that has the 45-tooth sprocket.
- The remaining sections will be aligned using the sprocket shaft as the driving component. This information will be reported on a redlined copy of drawing L-33033. Much like the alignment work on the motor/gearbox coupling, no other work can be underway on or near the bridge collector while the alignment work is happening. Coordinate signoff of the ITP with the contract administrator before proceeding with alignment of cog wheels.
- After the main drive shaft pieces are bolted-up and re-aligned, the cogwheel axles can be installed. Align the reversed hubs on the cogwheel axles (driven) to the main drive shaft rigid coupling hubs (driving). This alignment must also take into account the requirements of the cog track, such as inclination, and camber. The elevation of the contact point of the cogwheels is determined by the shim heights placed under the cogwheel axle pillow blocks. However, this can be corrected by adding additional shims to the running wheel axle pillow block bases. Adjust the cogwheels so that both wheels have rollers that are in full contact with the cog track teeth at the same time. Coordinate signoff of the ITP with the contract administrator before proceeding with alignment of running wheels.
- Install and align the running wheels after the cogwheels, as the running wheels will need to be adjusted to achieve the correct final elevation of the contact point between the cogwheel rollers and the cog track teeth at the tooth profile pitch line. Because the running wheels are flanged on the North side and flat on the South side, they are intended to allow some amount of sideways variation relative to the top of the rail head. The alignment focus should therefore be on the flanged wheels on the North side of the clarifier.
- Bolt the axles to the pillow block bases and then complete the first alignment check. Once this is complete, the bridge will be lowered to the cogwheel contact with the cog track. The bridge collector will then be lifted again and adjustments made to the running wheels to reach the required alignment. Coordinate signoff of the ITP with the contract administrator.
- Because friction and wear at the running wheels has been a cause of excessive torque and bridge malfunction in the past, the alignment of these parts is critical to the proper functioning of the machine as a whole. As such the contractor's focus should be especially strong on this portion of the work.

### **4.3.3 Electrical/Control Works**

As noted earlier, electrical/control works would be completed during the initial mechanical works on this clarifier.

## **4.4 STRUCTURAL WORKS**

Minor structural weld repairs and festoon supports painting on this clarifier will be completed during the initial clarifier shutdown period. The mechanical works will establish the overall time required to complete clarifier 3 work.

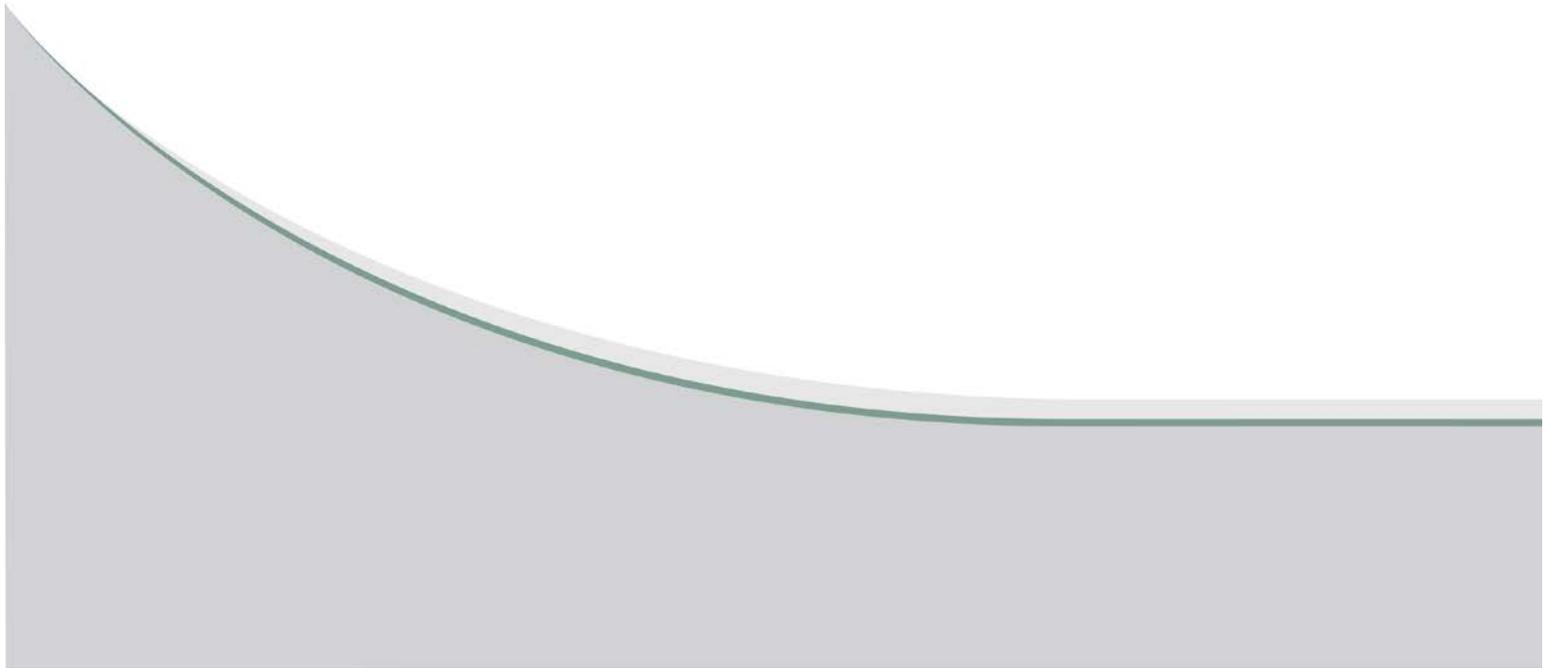
## **4.5 COMMISSIONING AND HANDOVER TO CITY**

At the end of the construction phase, the contractor will undertake the commissioning of each of the clarifier travelling bridge collectors. The Commissioning Plan document details the steps involved and the time required to complete the commissioning of each bridge collector. Following the commissioning of the equipment the contractor will hand-over each of the primary clarifiers to the City for process start-up.

## **5.0 PRIMARY CLARIFIER NO. 1 & 2 SHUTDOWN**

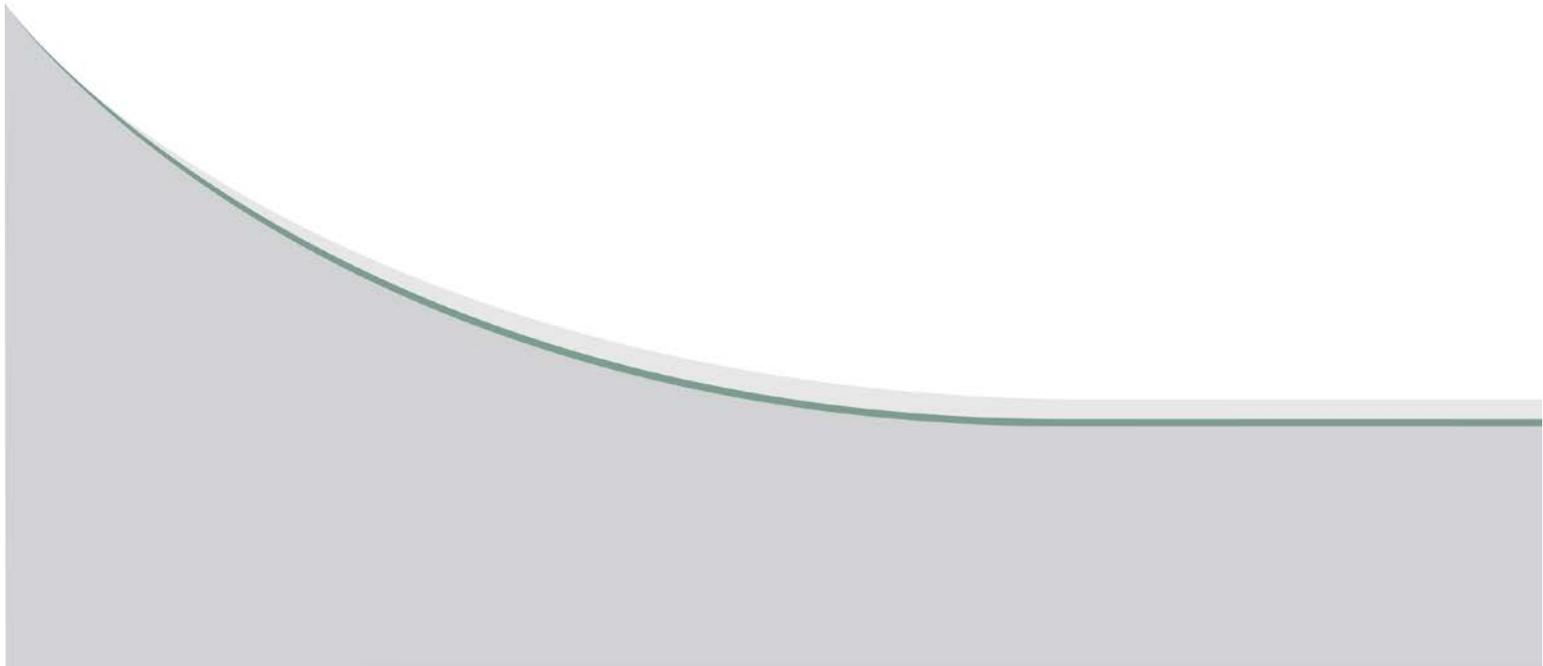
Electrical/control and minor paint repairs on these two clarifiers will take place after clarifier 3 work is completed and placed back in operation.

**APPENDIX A**  
**PROJECT SCHEDULE**





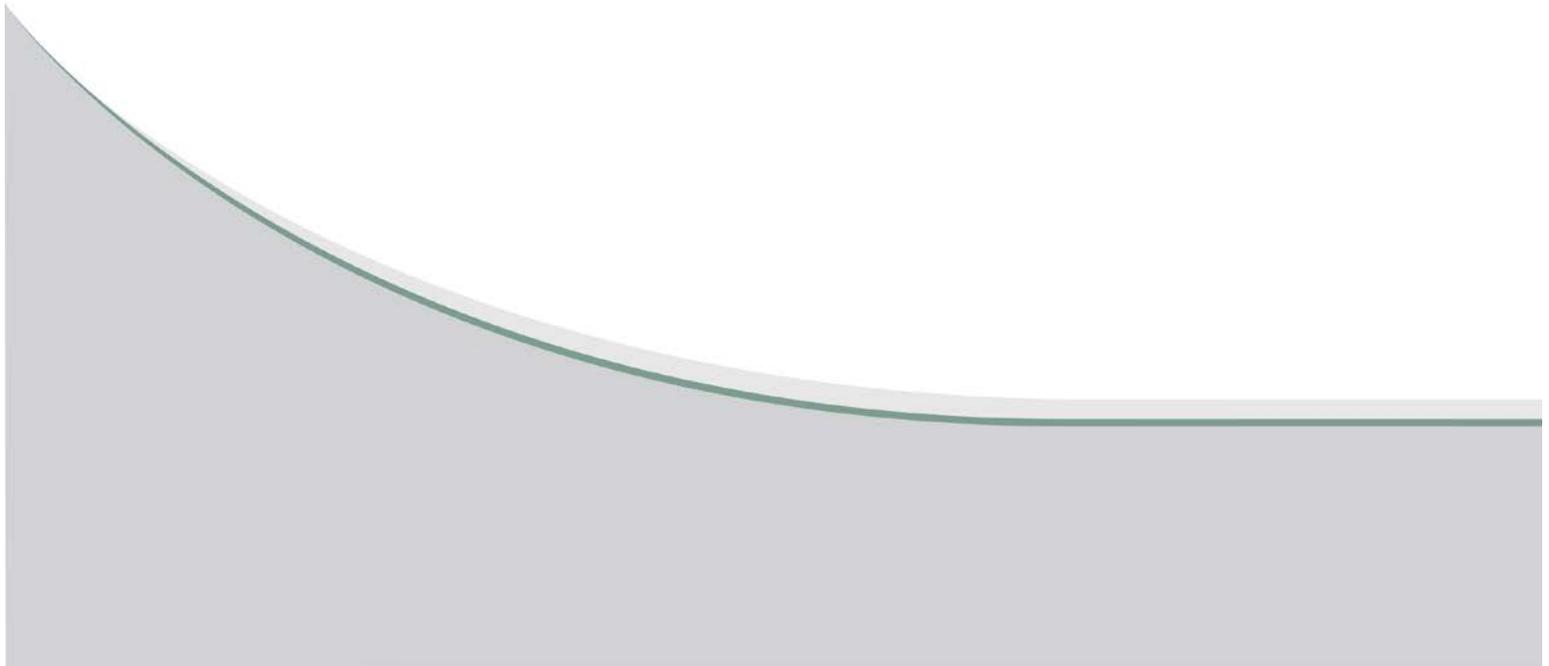
**APPENDIX B**  
**CONTACT INFORMATION TABLE**



**BID OP. 682-2018: CONSTRUCTION PLAN - APPENDIX B**  
**TABLE OF CONTACT INFORMATION**

First	Last	Organization	Role	Phone	Email
name	name	CONTRACTOR1	Project Manager		
name	name	CONTRACTOR1	Job Superintendent		
name	name	CONTRACTOR1	Field Supervisor (Foreman)		
name	name	CONTRACTOR2	Project Manager		
name	name	CONTRACTOR2	Job Superintendent		
name	name	CONTRACTOR2	Field Supervisor (Foreman)		
Rudy	Derksen	KGS Group	Project Manager	204-896-1209 ext.246	rderksen@kgsgroup.com
Ken	Dyck	KGS Group	Structural Engineer	204-896-1209 ext.354	kdyck@kgsgroup.com
Dennis	Guevarra	KGS Group	Electrical Technologist	204-896-1209 ext.491	dguevarra@kgsgroup.com
Dustin	Wilson	KGS Group	Electrical Engineer	204-896-1209 ext.297	dwilson@kgsgroup.com
Colburn	Holbrook	KGS Group	Mechanical Engineer	204-896-1209 ext.352	cholbrook@kgsgroup.ca
Brian	Station	City of Winnipeg WWSD	Project Manager	204-986-7642	bstation@winnipeg.ca
Shane	Westover	City of Winnipeg WWSD	SEWPCC Supervisor		swestover@winnipeg.ca
Dean	Kosowan	City of Winnipeg WWSD	Supervisor Mech. Maintenance		dkosowan@winnipeg.ca
Kurt	Schimke	City of Winnipeg WWSD	Supervisor Elec. & Instr. Maintenance		kschimke@winnipeg.ca

**APPENDIX C**  
**SUGGESTED SEQUENCE OF WORK**



**BID OP. 682-2018: CONSTRUCTION PLAN - APPENDIX C  
TRAVELLING BRIDGE COLLECTOR DRIVE SYSTEM SEQUENCE OF WORK**

#	Task	Action	Object
1	Accept delivery of City Supplied Materials	SET-UP	
2	Set up equipment and materials storage at designated laydown area	SET-UP	
3	Shut down primary clarifier No.3 (CITY)	SHUT-DOWN	
4	Prep bridge collector for maintenance and roll it to service area (CITY)	SHUT-DOWN	
5	Handover of clarifier from City to Contractor	SHUT-DOWN	
6			
7	Lift Bridge collector off rails / tracks	DISASSEMBLY	END TRUCKS
8	Drain chain guard assembly of oil	DISASSEMBLY	CHAIN
9	Unbolt Running Wheel Axle Pillow Blocks	DISASSEMBLY	RUNNING WHEELS
10	Remove Running Wheel Assembly and store	DISASSEMBLY	RUNNING WHEELS
11	Disassemble Cogwheel axle couplings	DISASSEMBLY	COGWHEELS
12	Disassemble Cogwheel axle pillow blocks	DISASSEMBLY	COGWHEELS
13	Remove Cogwheel assembly and store	DISASSEMBLY	COGWHEELS
14	Disassemble chain guard assembly	DISASSEMBLY	CHAIN
15	Remove drive chain and store	DISASSEMBLY	CHAIN
16	Remove existing 20T sprocket from gearbox output shaft	DISASSEMBLY	DRIVE SPROCKET
17	Disassemble main drive shaft couplings	DISASSEMBLY	MAIN DRIVE SHAFT
18	Disassemble main drive shaft pillow blocks	DISASSEMBLY	MAIN DRIVE SHAFT
19	Remove main drive shaft sections prep for shipment	DISASSEMBLY	MAIN DRIVE SHAFT
20	Remove, tag, and store any remaining loose parts	DISASSEMBLY	MAIN DRIVE SHAFT
21	Ship equipment to shop	DISASSEMBLY	ALL
22			
23	Check alignment of Aluminum Truss Structure Bearing Pads	ALIGN	MAIN DRIVE SHAFT
24	Install new 20T sprocket on gearbox output shaft	ASSEMBLY	MAIN DRIVE SHAFT
25	Align main drive shaft pillow blocks (without shaft/bearings)	ALIGN	MAIN DRIVE SHAFT
26	Align cog wheel axle pillow blocks (without shaft/bearings)	ALIGN	RUNNING WHEELS
27	Align running wheel axle pillow blocks (without shaft/bearings)	ALIGN	COGWHEELS
28			
29	Inspect and photograph shafts upon delivery to shop	INSPECT	ALL
30	Remove coupling hubs from drive shaft sections	DISASSEMBLY	MAIN DRIVE SHAFT
31	Remove bearings, sleeves from drive shaft sections	DISASSEMBLY	MAIN DRIVE SHAFT
32	Check dimensions main drive shaft sections and provide shop drawing	INSPECT	MAIN DRIVE SHAFT
33	Install and rough position new bearings/sleeves on main drive shaft sections	ASSEMBLY	MAIN DRIVE SHAFT
34	Re-Install existing coupling hubs on main drive shaft sections	ASSEMBLY	MAIN DRIVE SHAFT
35	Install and position new bearings/sleeves on cogwheel axles	ASSEMBLY	COGWHEELS
36	Install coupling hubs on cogwheel axle	ASSEMBLY	COGWHEELS
37	Install and position new bearings/sleeves on running wheel axles	ASSEMBLY	RUNNING WHEELS
38	Install coupling hubs on running wheel shaft	ASSEMBLY	RUNNING WHEELS
39	Return shafts to site	SHIPMENT	ALL
40			
41	Intall main drive shaft sections	ASSEMBLY	MAIN DRIVE SHAFT
42	Check alignment of main drive shaft sections	ALIGN	MAIN DRIVE SHAFT
43	Assemble drive shaft couplings	ASSEMBLY	MAIN DRIVE SHAFT
44	Install cog wheel axles	ASSEMBLY	COGWHEELS
45	Check alignment cog wheel axles	ALIGN	COGWHEELS
46	Assemble drive shaft to cog wheel axle couplings	ASSEMBLY	COGWHEELS

**BID OP. 682-2018: CONSTRUCTION PLAN - APPENDIX C  
TRAVELLING BRIDGE COLLECTOR DRIVE SYSTEM SEQUENCE OF WORK**

#	Task	Action	Object
47	Install running wheel axles	ASSEMBLY	RUNNING WHEELS
48	Check alignment running wheel axles	ALIGN	RUNNING WHEELS
49	Lower Bridge collector	ASSEMBLY	END TRUCKS
50	Check alignment of cog wheels to cog track	ALIGN	COGWHEELS
51	Check alignment running wheels to running rail	ALIGN	RUNNING WHEELS
52	Lift bridge collector	ASSEMBLY	END TRUCKS
53	Shim running wheels	ASSEMBLY	RUNNING WHEELS
54	Lower Bridge collector	ASSEMBLY	END TRUCKS
55	Install drive chain	ASSEMBLY	CHAIN
56	Re-assemble chainguard	ASSEMBLY	CHAIN
57	Lubricate Chain guard, bearings, gearbox, etc	LUBRICATE	ALL
58			
59	Bridge collector commissioning	COMMISSION	
60	Clean-up clarifier service area	CLEAN	
61	Handover of clarifier from Contractor to City	START-UP	
62	Teardown equipment in laydown area	TEAR-DOWN	
63	Discard waste materials	TEAR-DOWN	

**BID OP. 682-2018: CONSTRUCTION PLAN - APPENDIX C  
TRAVELLING BRIDGE COLLECTOR RAILS AND ANCHOR BOLTS SEQUENCE OF WORK**

#	Task	Object	
1	Provide new anchor bolt arrangement drawing to Contract Administrator	SET-UP	
2	Accept delivery of City Supplied Materials	SET-UP	
3	Set up equipment and materials storage at designated laydown area	SET-UP	
4	Shut down primary clarifier No.3 (CITY)	SHUT-DOWN	
5	Prep bridge collector for maintenance and roll it to service area (CITY)	SHUT-DOWN	
6	Handover of clarifier from City to Contractor	SHUT-DOWN	
7	Build scaffolding in clarifier tank	SET-UP	
8			
9	Unbolt/cut away all rails, track, and hardware (discard)	DEMOLITION	RAIL AND COG TRACK
10	Remove sole plates, pads, and shims	DEMOLITION	SOLE PLATES
11	Chip away grout	DEMOLITION	SOLE PLATES
12	Cut anchor bolts	DEMOLITION	ANCHOR BOLTS
13	Patch repair concrete as required	DEMOLITION	CONCRETE
14			
15	Survey and mark new grout pad locations	SURVEY	ANCHOR BOLTS
16	Roughen concrete for grout pads	INSTALL	ANCHOR BOLTS
17	Survey, align, and mark anchor bolt locations	ALIGN	ANCHOR BOLTS
18	Drill and install new adhesive anchors	INSTALL	ANCHOR BOLTS
19	Position and level sole plates	ALIGN	SOLE PLATES
20	Apply grout to sole plates, check for bubbles	INSTALL	SOLE PLATES
21	Remove sole plates	INSTALL	SOLE PLATES
22	Check Levelness/elevation of grout pads	ALIGN	SOLE PLATES
23	Install shims	INSTALL	SOLE PLATES
24	Install neoprene pads	INSTALL	SOLE PLATES
25	Reinstall sole plates	INSTALL	SOLE PLATES
26	Place, align, mark, rail sections	ALIGN	RAIL
27	Cut, drill, rail sections	INSTALL	RAIL
28	Install rail sections	INSTALL	RAIL
29	Adjust rail alignment	ALIGN	RAIL
30	Position and align cog track mounting clip angles	ALIGN	COG TRACK
31	Cut, drill, cog track sections	INSTALL	COG TRACK
32	Install cog track sections	INSTALL	COG TRACK
33	Adjust cog track alignment	ALIGN	COG TRACK
34	Verify cog track phase differential, section spacing	ALIGN	COG TRACK
35			
36	Bridge collector commissioning	COMMISSION	
37	Clean-up work area	CLEAN	
38	Dis-assemble scaffolding in clarifier tank	TEAR-DOWN	
39	Handover of clarifier from Contractor to City	START-UP	
40	Teardown equipment in laydown area	TEAR-DOWN	
41	Discard waste materials	TEAR-DOWN	

**KGS**  
GROUP  
CONSULTING  
ENGINEERS

