

1 GENERAL

1.01 SUBMITTALS

- .1 Submit Rack Arm shop drawings at least 20 days prior to steel fabrication; include at least the following information:
 - .1 Provide details as per Section 05 50 00 - Metal Fabrications, clause 1.02.

2 PRODUCTS

2.01 FABRICATION

- .1 Refer to Section 05 50 00 - Metal Fabrications for metal fabrication requirements.

3 EXECUTION

3.01 OPERATING BACK ARMS ASSEMBLY AND NEW UPPER LEFT RACK ARM

- .1 Salvage all parts of the existing upper left operating rack arm including the rack arm pins, fittings and brackets, as approved by the Departmental Representative.
- .2 Locate spare rack arm stored on-Site. Use spare rack arm to measure and develop shop drawings and fabricate a new rack arm as per requirements of Section 05 50 00 - Metal Fabrications.
- .3 Remove and dispose of upper left rack arm at approved Waste Disposal Facility off-Site.
- .4 Re-use salvaged parts and install new upper left rack arm. Put spare rack arm back into storage.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

- .1 Fisheries Act, Departmental Representative of Justice, Canada, latest revision.

1.02 SUBMITTALS

- .1 A Lock Dewatering Plan, at least 35 days prior to commencing Work at the Site, that addresses the following items:
 - .1 Cofferdam construction details and sequencing, including granular fill placement methodology, sheet pile installation, PVC liner installation,
 - .2 Turbidity monitoring procedures,
 - .3 Turbidity measures and barriers being implemented,
 - .4 Fish capture and release,
 - .5 Initial dewatering of the lock,
 - .6 Ongoing dewatering activities,
 - .7 Removal of temporary works,
 - .8 Reinstatement of the lock,
 - .9 Backup plan during a power failure or pump failure, and
 - .10 General Site Care of Water activities.
- .2 Submit digital copies of water quality test results weekly, or as requested by the Departmental Representative. Submit laboratory results demonstrating the normally occurring linear relationship between Total Suspended Solids (TSS) and Turbidity Units (NTU) into mg/L prior to initiating turbidity monitoring and related Work.
- .3 Submit product data for turbidity barriers and products prior to shipping to Site.
- .4 Copy of each permit obtained in addition to those obtained by the Departmental Representative.

1.03 REGULATORY REQUIREMENTS

- .1 Comply with the conditions of the permits for the Project obtained by the Departmental Representative under the Fisheries Act.
- .2 Make arrangements with the Departmental Representative, landowners or other agencies that may be affected by disposal of water, snow or ice. Obtain any permits required in addition to those obtained by the Departmental Representative.

1.04 DESIGN OF CARE OF WATER PROVISIONS

- .1 Design temporary care of water measures including cofferdams, sumps, pumping systems, pipelines, drains, and other protective and dewatering works to permit construction of the Work in the dry.
- .2 Include provisions for handling groundwater, rainstorm runoff, snow, snowmelt, and ice that may enter the Work areas.

- .3 Design dewatering systems that can lower and maintain no standing water in the lock chamber to allow construction of the Work in the dry, and on a stable foundation, with no loss of foundation materials or materials from excavated surfaces.
- .4 The dewatering system must be capable of completely dewatering the lock chamber within 24 hours, while allowing for a seepage inflow of 500 L/s.
- .5 Ongoing dewatering system to consider a minimum seepage inflow (e.g. seepage through cofferdam and lock chamber foundation) of 500 L/s.
- .6 Limit the rate of lock dewatering to 1 metre of per hour for the final (lowest) 4 metres of standing water in the lock.
- .7 Design and provide protective works, including enclosures, insulation and heating systems, such that dewatering systems operate continuously and do no freeze during cold weather.
- .8 Design and implement measures to ensure the Maximum Allowable increase in Total Suspended Solids (Max-TSS) is not exceeded in receiving waterbodies.
 - .1 Design, supply and utilize sediment removal systems such as filtration bags, flocculants or other suitable methods to achieve turbidity release requirements.
 - .2 Design supply and implement Site isolation measures such as turbidity barriers or other suitable measures to achieve turbidity release requirements.

1.05 TURBIDITY MONITORING

- .1 Sampling and Testing
 - .1 Perform all sampling and testing of Total Suspended Solids (TSS) as specified herein.
 - .2 Prior to the start of construction, determine the normally occurring linear relationship between Total Suspended Solids (TSS) and Turbidity Units (NTU) into mg/L.
 - .3 During construction, perform the following:
 - .1 Measure suspended solids in NTU accurate to within 2% of the calibration solution of the equipment.
 - .2 Convert NTU into mg/L to establish the relationship specific to the Site.
 - .3 Measure upstream and downstream NTU levels within a maximum period of 30 minutes of each other, or as directed by the Departmental Representative, unless there is a sediment release (see monitoring frequency below).
- .2 Sampling Frequency
 - .1 Perform sampling 30 minutes prior to daily construction activities until 30 minutes after construction activities have been completed.
 - .2 Perform TSS sampling at the following frequency:

Site Conditions	Monitoring Frequency
Instream Construction Activities and Accidental Occurrences	<ul style="list-style-type: none">• During construction hours, sample at a minimum of once every hour at all compliance transects.• If an exceedance or plume is observed, sampling within the plume until TSS levels have returned to acceptable background levels for two consecutive sampling events.

	<ul style="list-style-type: none"> Do not sample during accidental occurrences until it is safe to do so.
Isolated Construction Activities	<ul style="list-style-type: none"> When the working within Site isolation, take samples at all transects at three-hour intervals, during construction hours. If sample results have not exceeded 5 mg/L above background levels for five consecutive active construction days, the sample frequency may be reduced to a minimum of twice per day, or as directed by the Departmental Representative.

.3 Compliance Monitoring

.1 Conduct compliance monitoring as follows:

- .1 Background: upstream of the work area.
- .2 Transect 1: 50 m downstream from work area.
- .3 Transect 2: 125 m downstream from the work area.
- .4 Transect 3: 225 downstream from work area.
- .5 Sample points along transect: 25%, 50% and 75% of wetted width transect.

.4 Visual Plume Monitoring

.1 If a visually conspicuous plume is observed, immediately cease all Work, undertake mitigation measures, contact the Departmental Representative, and promptly initiate a Plume TSS Monitoring Program in accordance with the following:

- .1 All Work that may have a direct or indirect effect on water quality will cease during all plume occurrences.
- .2 Take a sample from the middle of the plume and as close to the source of the plume as possible (within safety limits).
- .3 Monitor at all transects and the plume sampling point, as often as feasible (a minimum of an hourly basis), and continue until two consecutive monitoring events show no compliance exceedances.

.5 Compliance Criteria

.1 Following completion of each TSS monitoring event, determine if the construction activities are within compliance limits as defined in the table below. This will be accomplished as follows:

- .1 Average the results of each of the upstream sample points to determine a background TSS (mg/L) for each event.
- .2 Calculate the average TSS concentration (mg/L) for each of the downstream transects (cross sections) and compare the average value for each transect to the background TSS concentration (mg/L). If the results for any transect exceeds the limits in the table below, the project is not in compliance. The average value for any transect is calculated as the arithmetic average of the sample points in that transect.
- .3 Compare any differences with the TSS Compliance Criteria to determine if the construction works (i.e. isolated or instream construction activities) are within compliance.

.2 Utilize equipment, labour, and procedures in a manner that ensures that the levels of TSS are maintained below the following levels:

Site Conditions (Background TSS)	Exceedance Levels (TSS in Excess of Normal Background Levels)
TSS < 25 mg/L	<ul style="list-style-type: none"> A maximum instantaneous increase of 25 mg/L

	over background levels at any time. <ul style="list-style-type: none">• An average increase of > 5 mg/L over background levels for more than 24 hours.
TSS = 25 - 250 mg/L	<ul style="list-style-type: none">• A maximum instantaneous increase of 25 mg/L from background levels at any time.
TSS > 250 mg/L	<ul style="list-style-type: none">• A maximum instantaneous increase of 10% of background levels at any time.

- .3 Notify the Departmental Representative at least 48 hours prior to the start of any instream construction activity.
- .4 If a measurement is over the Exceedance Levels listed in the table above, or an accidental occurrence that results in a visually conspicuous plume, cease all Work that may have a direct or indirect impact on water quality, and immediately initiate mitigation actions. Notify the Departmental Representative immediately.
- .5 If an exceedance occurs during isolated construction activity and a reduced sampling program is in effect, the sampling frequency must be reset where the sampling frequency is to return to three hour intervals during construction hours.
- .6 Record Keeping
 - .1 Keep a detailed record of the sampling completed for the TSS monitoring program and provide daily reports to the Departmental Representative in a weekly summary format.
 - .2 Maintain daily sampling records up-to-date and keep on-Site at all times during the period in which the monitoring program is in effect.
 - .3 Upon completion of the construction activities, submit a final report containing all sampling and testing data to the Departmental Representative.
 - .4 Include the following in the weekly summary report:
 - .1 Brief description of the work and types of construction activities completed during the sampling period.
 - .2 Date and time of each sample.
 - .3 Weather conditions at the time of each sample.
 - .4 Changes of depth of flow at the upstream transect.
 - .5 Documentation of daily NTU instrument calibrations.
 - .6 Both turbidity (NTU) and TSS (mg/L) for each sample taken.
 - .7 The daily average value (mg/L TSS) of the upstream background samples.
 - .8 The daily average value (mg/L TSS) of each downstream transect (all three Sites per transect combined).
 - .9 Documentation of all non-compliance instances, including the level of exceedance, the duration of exceedance, the mitigation measures taken, verification of the reporting of the exceedances and any related communications with regulators regarding the exceedance event, and future measures to be taken to avoid and control further exceedances.
 - .10 Description of events or circumstances that may have prevented or hindered completion of the TSS monitoring program.

1.06 FISH CAPTURE AND RELEASE

- .1 Fish capture is required within the area being dewatered.
- .2 Provide the services of a Qualified Aquatic Environmental Specialist (QAES) to do the following:

- .1 Develop a written Fish Capture and Release (FC&R) Plan and include as part of the overall Lock Dewatering Plan. FC&R Plan to include:
 - .1 Fish isolation methods.
 - .2 Location of related equipment and set up.
 - .3 Water depths required for fish capture including drainage of draw-down methods.
 - .4 Fish capture, mobilization and release methods.
 - .5 Fish release locations.
- .2 Record fish capture and release activities and results and submit to the Departmental Representative.
- .3 Obtain Live Fish Handling Permit from the Government of Manitoba.
- .4 Obtain and follow policies with respect to fish capture and release according to the Fisheries Act.

2 EXECUTION

2.01 CARE OF WATER

- .1 Provide, operate and maintain all necessary cofferdams, channels, drains, well-points, wells, sumps, pipelines and other temporary diversion and protection works.
- .2 Provide a standby pump for each category of pump required on Site at all times during dewatering.
- .3 Inspect pump and pipeline systems at regular intervals not exceeding 10 hours (including nights, weekends and holidays) to verify that pumps are operating, there is sufficient fuel and cold weather protection is adequate. If required, decrease the time interval between inspection check to correspond with the type and nature of weather and the work in progress, to the satisfaction of the Departmental Representative. The individual responsible for checking the pumps and dewatering system should be qualified and know how to take pumps on/off line, start pumps, connect pumps to a backup power supply and re-fuel generators.
- .4 Repair damage to any part of the Work caused by water, snow or ice due to failure of the Care of Water measures.
- .5 When no longer required, remove cofferdams, sumps, channels, drains and other protective, dewater and temporary diversion works to the satisfaction of the Departmental Representative.

2.02 TURBIDITY MEASURES AND BARRIERS

- .1 Install turbidity and sediment control systems at the Site prior to any construction activity that may impact the quality of water in a nearby watercourse or waterbody.
- .2 Monitor and maintain the turbidity and sediment control systems during construction. Immediately rectify any deficiencies.
- .3 Adjust, improve or add to the turbidity and sediment control systems at the Site enduring construction to maintain allowable TSS levels.
- .4 Do not remove turbidity and sediment control systems until all construction activities that may adversely affect the turbidity levels in the watercourse

R.097505.001
2020-03-16

SECTION 35 20 22
DEWATERING
PAGE 6 of 6

or waterbody are complete.

END OF SECTION