CEDAR LAKE DAM ASSESSMENT

ST CROIX COUNTY, WISCONSIN

Prepared for

Cedar Lake Protection and Rehabilitation District

CEDAR CORPORATION
MENOMONIE, WI 54751

FEBRUARY 2020

INTRODUCTION

At the request of Cedar Lake Protection and Rehabilitation District, an assessment has been prepared by Cedar Corporation for the Cedar Lake Dam. The purpose of this assessment is to provide additional information on issues described in the required 2019 DNR inspection report concerning the concrete surface deterioration in Bay 5 and Bay 1 as well as preliminary cost estimates for potential repairs. A site visit was conducted by Cedar Corporation on December 4, 2019.

Cedar Lake Dam is located on Loon Creek near the Town of Star Prairie in St Croix County, Wisconsin. The site is in SW-NE Section 02, Township 31 North, Range 18 West. The DNR field file number is 55.15 with sequence number 2160. On June 3, 1949 the Public Service Commission granted a permit under Ch. 31.06 Wisconsin Statures to the Cedar Lake Improvement Club to construct and maintain a dam at the outlet of Cedar Lake. The dam components are shown in plan, elevation and section view elsewhere in this assessment report.

BACKGROUND

History: Between 1949 and 1986, the ownership of the dam transferred to Ms. Marion L. McMurtrie, Trustee. The ownership was later transferred via permit 3-WC-85-1803 from Marion L. McMurtrie, Trustee to the Cedar Lake Protection & Rehabilitation District. The permit was issued on June 18, 1986 which the district is currently listed as the owner and operator of the Cedar Lake Dam.

Structural Height: The structural height of the dam is the difference in elevation between the stream bed in the channel below the dam and the lowest point of the dam embankment at which overtopping would commence. The DNR inspection report determined the structural height to be less than 6.0 feet with a maximum storage of approximately 3300 acre-ft, therefore the Cedar Lake Dam is classified as small dam however is subject to various provisions under Wisconsin NR 333 Administrative Code.

Dam Characteristics: The dam is a concrete structure with four gated spillways with earthen parent embankments adjacent to either abutment. The overall length of the dam is approximately 40 feet. The dam is comprised of four bays. The bays are numbered one through four, looking downstream left to right. The bays vary in width with stoplog slots. With stoplogs removed, the bays contain virtually no obstructions. Stop logs are inserted in the spillway gates to control the level of Cedar Lake.

Water Level Order:
On July 8, 1987, the Department ordered that the Cedar Lake Protection & Rehabilitation District operate the Cedar Lake Dam in accordance with the water levels identified under docket 3-WC-86-1801. The water levels were established in reference to benchmark 632-F, which is described as a 2-inch square cut in the right abutment of the Cedar Lake Dam, about 2.5 feet right of the right end of the right gate. Its elevation is 98.76 ft, assumed datum. A North American Vertical Datum of 1988 (NAVD 88) was transferred to benchmark 632-F with a 920.35 elevation. Table 1 shows the relationship with NAVD 88 datum and the assumed datum.

TABLE 1.

Description	Assumed datum	Staff Gage	NVAD 88
BM 632-F	98.76		920.35
Normal Water Level	96.92	1.66	918.51
Max Water Level	97.16	1.91	918.75
Observed Water	96.53	1.05	918.12

OBSERVATIONS

The Cedar Lake Dam is generally in sound condition. The upstream reservoir and dam spillways are at or near typical elevations and the dam appear to be operating as expected. Construction performed in 1949 to the concrete elements and piers appear to be holding up well.

The left abutment of the dam is cracked with 2-4-inch separation between the upstream wingwall and abutment. Repair is recommended.

The right abutment of the dam is cracked between the downstream wingwall and abutment, but not as significant as the left abutment. Repair is not recommended at this time however, should be monitored.

Piers 1, 2 and 3 all appear to be in overall good condition. The pier noses and upstream steel armor are all in place and in good condition. Spalling and advance section loss was observed at the surface of the tailwater in each of the piers. The downstream repair of each pier is recommended.

Steel grates within each bay were installed to prevent invasive carp from migrating upstream. The grates have sustained minor damage and may be ineffective to detour carp from migrating upstream. Repair to the grates are recommended.

Streambed scouring was observed upstream and downstream of the dam. Riprap is recommended to armor and protect the streambed from further scouring.

REHABILITATION COST ANALYIS

There are several options in the rehabilitation cost analysis available to Cedar Lake Protection and Rehabilitation District for the concrete repairs and general maintenance along with the do-nothing option, however it is strongly recommended to consider construction in approximately 1 – 2 years. Option 1 list several items with associated costs recommended as a minimum rehabilitation project. Proposed rehabilitation costs for option 1 is $102,145.00 which includes contingencies and professional services. Option 2 list several items and associated costs for a rehabilitation project that includes additional items such as Clearing Grubbing, Concrete Wing

Repair Right Abutment, Gate Sleeve Repair, Steel Bridge Stop Log Crane, Carp Grate and associated quantities. Proposed rehabilitation costs for option 2 is $179,800 which also includes contingencies and professional services. Both options can be found in Exhibit 3.

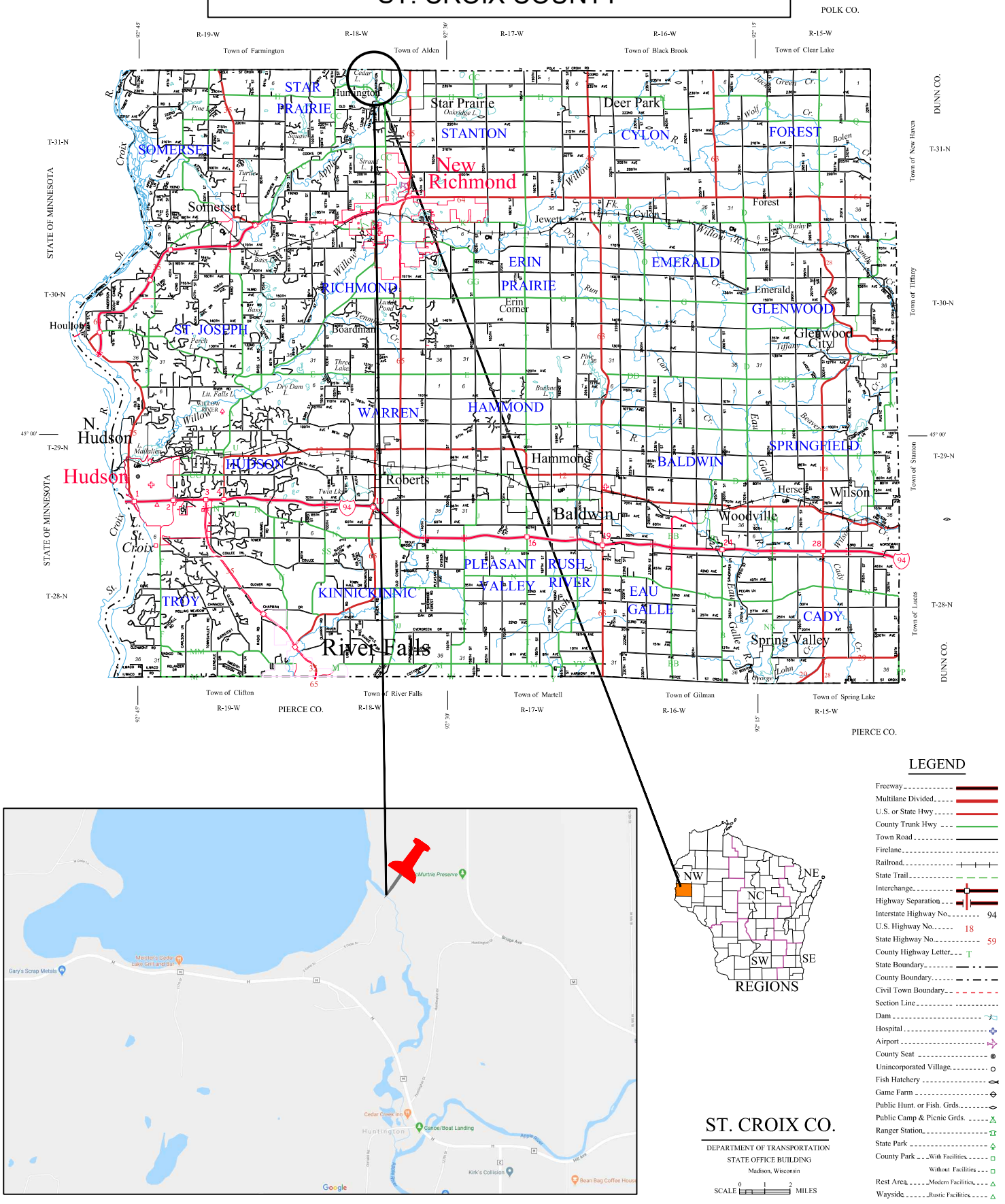
EXHIBITS

Exhibit 1	Location Maps
Exhibit 2	Site Plan
Exhibit 3	Rehabilitation Cost Analysis

Exhibit 1: LOCATION MAPS

PROJECT LOCATION MAP

C6316-001
CLEAR LAKE DAM
ST. CROIX COUNTY



LEGEND

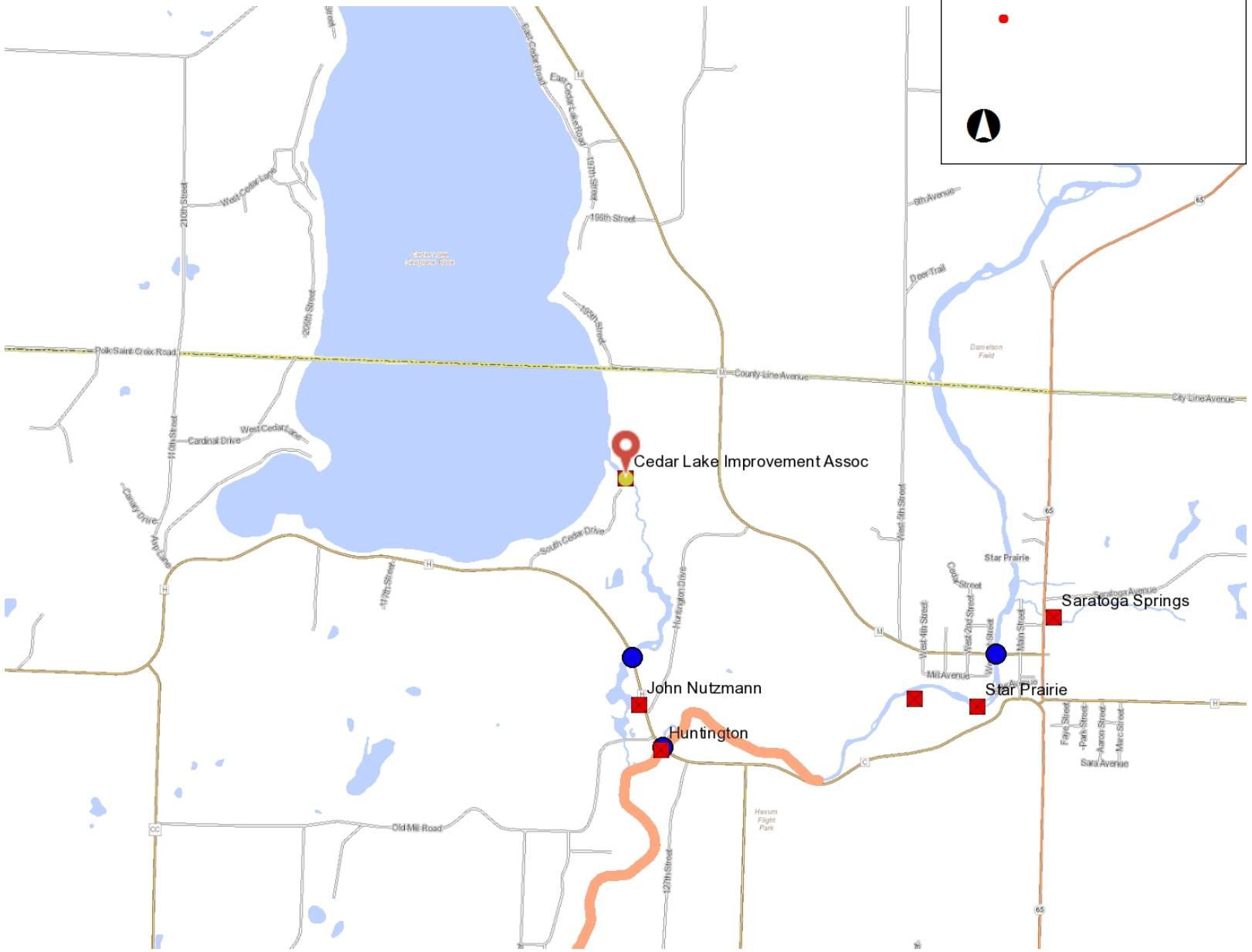
- Freeway
- Multilane Divided
- U.S. or State Hwy
- County Trunk Hwy
- Town Road
- Firelane
- Railroad
- State Trail
- Interchange
- Highway Separation
- Interstate Highway No. 94
- U.S. Highway No. 18
- State Highway No. 59
- County Highway Letter T
- State Boundary
- County Boundary
- Civil Town Boundary
- Section Line
- Dam
- Hospital
- Airport
- County Seat
- Unincorporated Village
- Fish Hatchery
- Game Farm
- Public Hunt. or Fish. Grds.
- Public Camp & Picnic Grds.
- Ranger Station
- State Park
- County Park — With Facilities / Without Facilities
- Rest Area — Modern Facilities
- Wayside — Rustic Facilities

ST. CROIX CO.

DEPARTMENT OF TRANSPORTATION
STATE OFFICE BUILDING
Madison, Wisconsin

SCALE 0 1 2 MILES

Surface Water Data Viewer Map



Legend

- Dams
  - Dams with FERC License
  - Dams
- DOT Bridges
- Floodplain Analysis Lines
  - Other
  - Flood Insurance Study
  - Letter of Map Revision
  - Case By Case Analysis
  - Bridge
- Floodplain Analysis Points
  - Other
  - Flood Insurance Study
  - Letter of Map Revision
  - Case By Case Analysis
  - Bridge
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

Notes

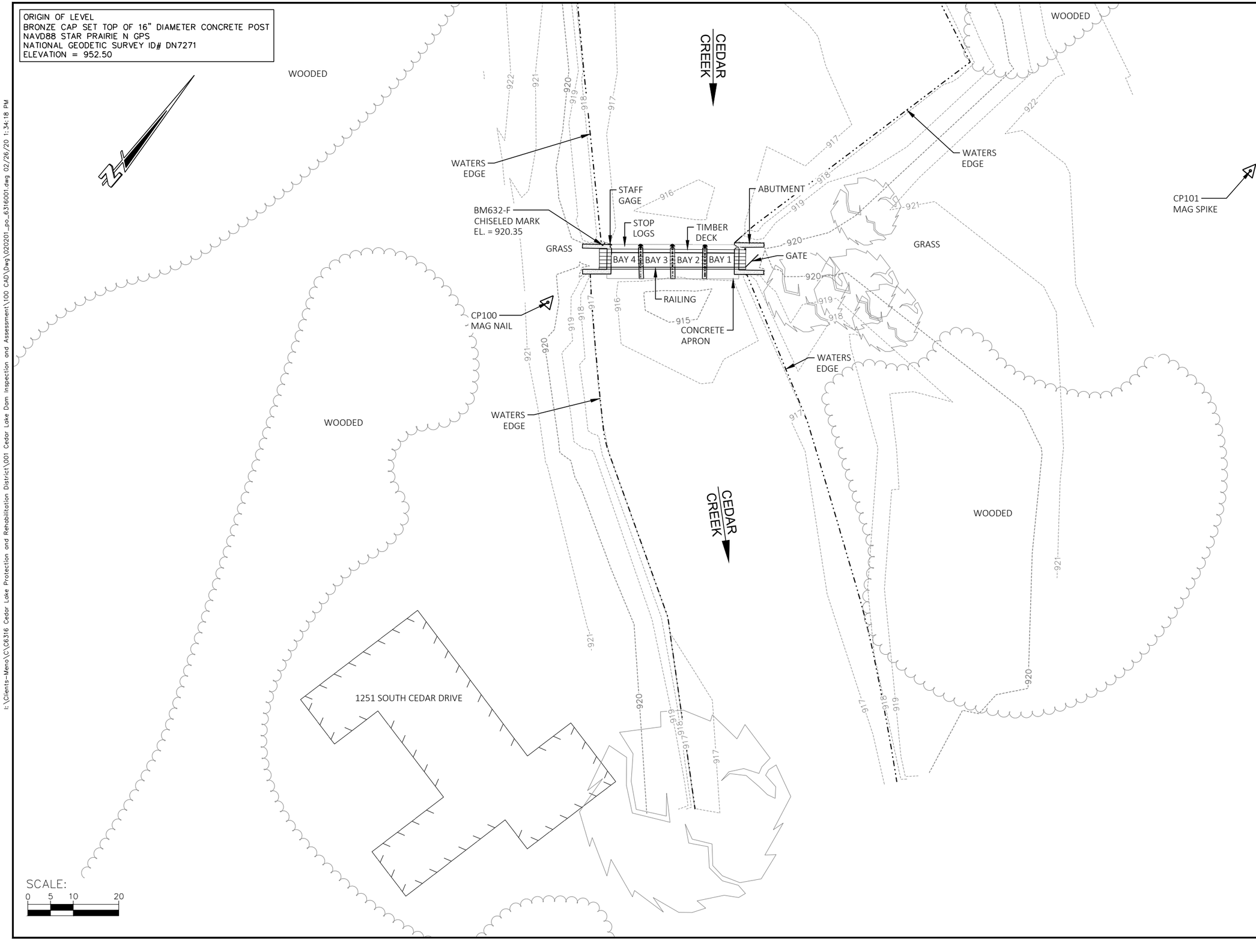
1.0 0 0.50 1.0 Miles

NAD_1983_HARN_Wisconsin_TM

1: 31,680

Exhibit 2: SITE PLANS

ORIGIN OF LEVEL
BRONZE CAP SET TOP OF 16" DIAMETER CONCRETE POST
NAVD88 STAR PRAIRIE N GPS
NATIONAL GEODETIC SURVEY ID# DN7271
ELEVATION = 952.50



SCALE:
0 5 10 20

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CHECKED BY JME
DATE 02/26/2020
REVISIONS
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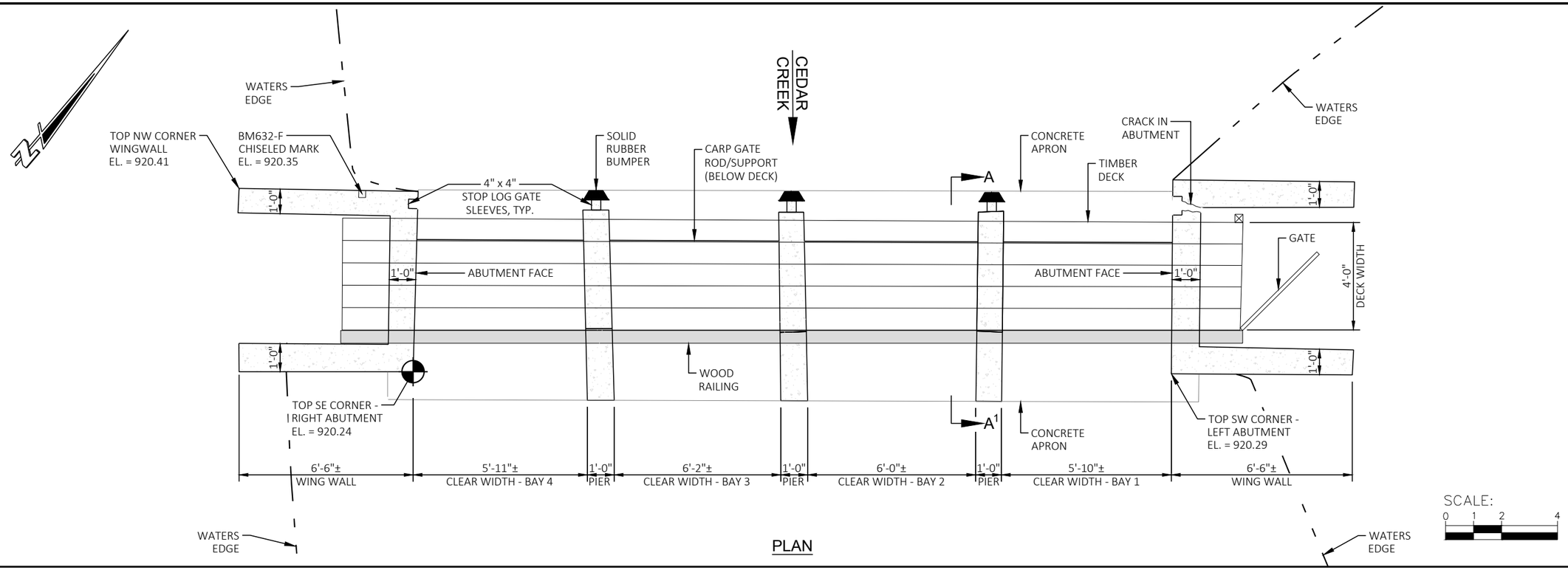
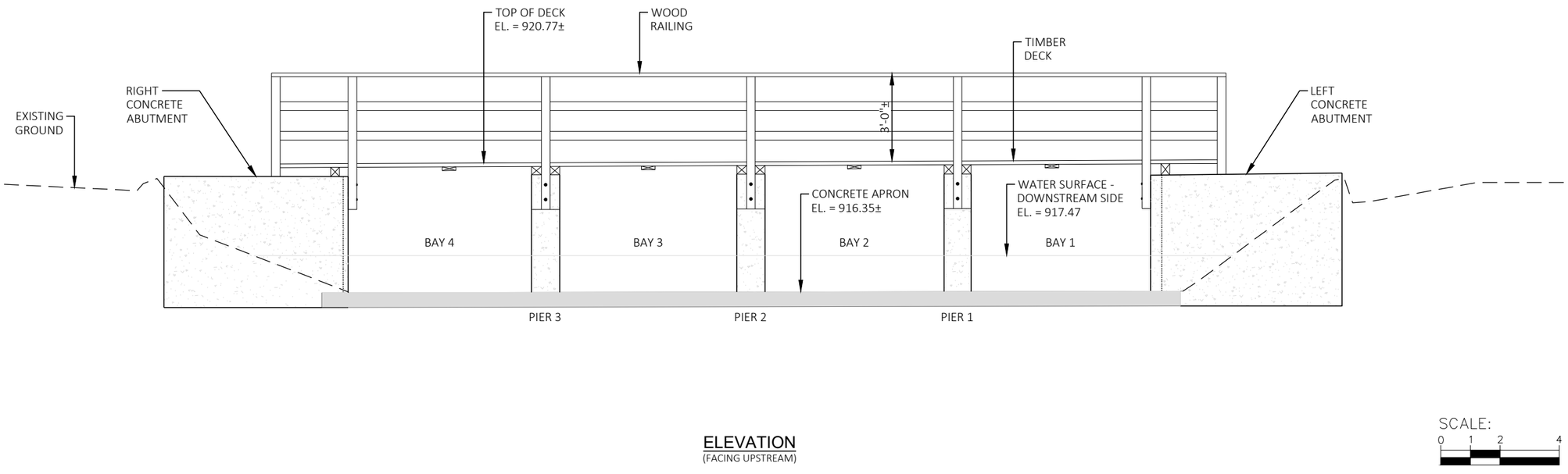
CEDAR LAKE DAM

CEDAR LAKE PROTECTION & REHABILITATION DISTRICT
TOWN OF STAR PRAIRIE
ST. CROIX COUNTY, WI

SHEET NO.
1 OF 3



PLAN



ELEVATION
(FACING UPSTREAM)

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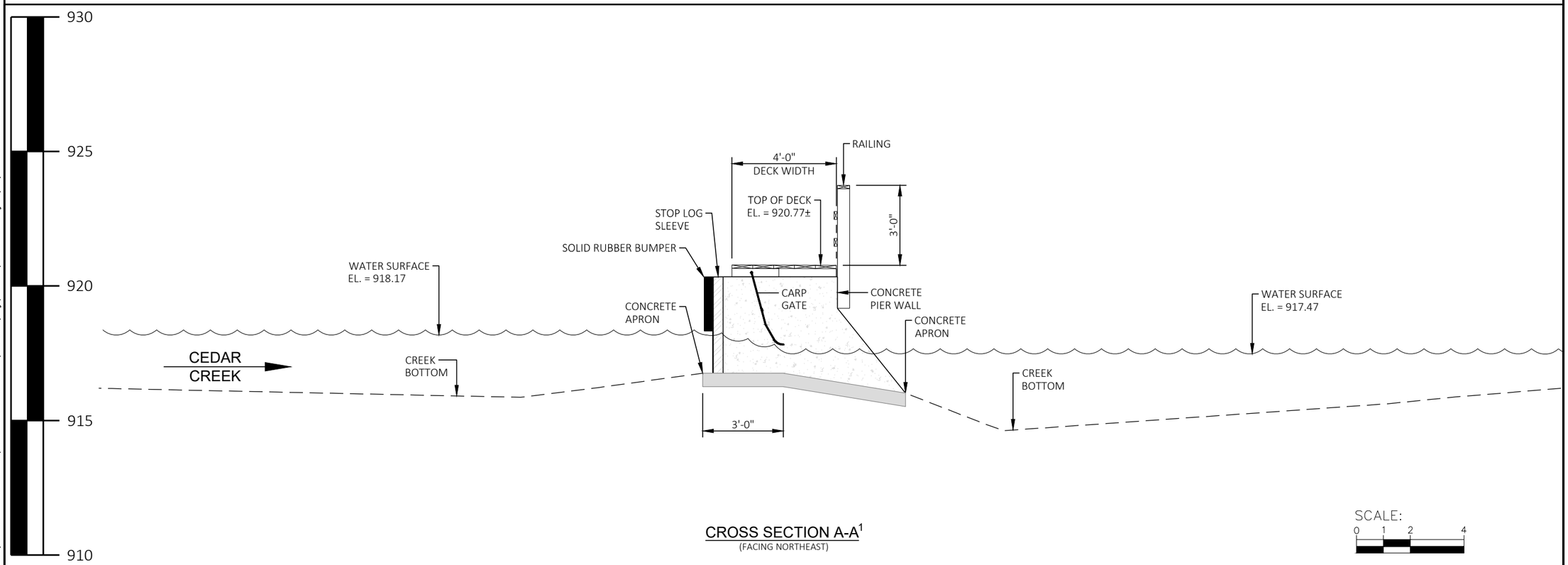
SHEET NO.
2 OF 3



CROSS SECTION A-A[1]
(FACING NORTHEAST)

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CEDAR LAKE PROTECTION & REHABILITATION DISTRICT
TOWN OF STAR PRAIRIE
ST. CROIX COUNTY, WI

SHEET NO.
3 OF 3

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Exhibit 3: REHABILITATION COST ANALYSIS

OPTION 1 PROPOSED REHABILITATION PROJECT

CEDAR LAKE PROTECTION & REHABILITAION DISTRICT

CEDAR LAKE DAM

ST CROIX COUNTY, WISCONSIN

February 27, 2020

Item	Unit Price	Unit	Quantity	Total
EXCAVATION STRUCTURE	$5,000.00	EACH	1.0	$5,000.00
FINISHING (PROJECT) CEDAR CREEK DAM	$1,000.00	EACH	1.0	$1,000.00
CONCRETE WING REPAIR LEFT ABUTMENT	$5,000.00	LS	1.0	$5,000.00
MASONRY ANCHORS TYPE L NO. 4 BARS	$40.00	EACH	50.0	$2,000.00
CONCRETE PIER REPAIR, DOWNSTREAM	$2,000.00	EA	2.0	$4,000.00
RIPRAP HEAVY	$80.00	CY	80.0	$6,400.00
MOBILIZATION	$15,000.00	EACH	1.0	$15,000.00
MOBILIZATIONS EROSION CONTROL	$1,000.00	EACH	1.0	$1,000.00
DEWATERING	$20,000.00	LS	1.0	$20,000.00
TEMPORARY SHEET PILE	$30.00	SF	50	$1,500.00
MISCELANEOUS EROSION CONTROL	$5,000.00	LS	1.0	$5,000.00
CONSTRUCTION TOTAL				$65,900.00
DESIGN AND CONTRUCTION SERVICES	30%			$19,770.00
CONTINGINCIES	20%			$13,180.00
TOTAL PROJECT				$98,850.00

OPTION 2 PROPOSED REHABILITATION PROJECT

CEDAR LAKE PROTECTION & REHABILITAION DISTRICT

CEDAR LAKE DAM

ST CROIX COUNTY, WISCONSIN

February 27, 2020

Item	Unit Price	Unit	Quantity	Total
EXCAVATION STRUCTURE	$10,000.00	EACH	1.0	$10,000.00
CLEAR AND GRUB	$4,000.00	LS	1.0	$4,000.00
FINISHING (PROJECT) CEDAR CREEK DAM	$1,000.00	EACH	1.0	$1,000.00
CONCRETE WING REPAIR LEFT ABUTMENT	$5,000.00	LS	1.0	$5,000.00
CONCRETE WING REPAIR RIGHT ABUTMENT	$5,000.00	LS	1.0	$5,000.00
GATE SLEEVE REPAIR	$1,200.00	EA	8.0	$9,600.00
MASONRY ANCHORS TYPE L NO. 4 BARS	$40.00	EACH	100.0	$4,000.00
CONCRETE PIER REPAIR, DOWNSTREAM	$2,000.00	EA	3.0	$6,000.00
RIPRAP HEAVY	$80.00	CY	80.0	$6,400.00
MOBILIZATION	$20,000.00	EACH	1.0	$20,000.00
MOBILIZATIONS EROSION CONTROL	$1,000.00	EACH	1.0	$1,000.00
DEWATERING	$20,000.00	LS	1.0	$20,000.00
TEMPORARY SHEET PILE	$30.00	SF	100	$3,000.00
MISCELANEOUS EROSION CONTROL	$5,000.00	LS	1.0	$5,000.00
STEEL BRIDGE	$10,000.00	LS	1.0	$10,000.00
STOP LOG CRANE	$5,000.00	LS	1.0	$5,000.00
RAILING	$8,000.00	LS	1.0	$8,000.00
CARP GRATE	$1,000.00	LS	1.0	$1,000.00
WATER SURFACE GAGE	$200.00	LS	1.0	$200.00
DAM SIGNS	$200.00	EA	4.0	$800.00
CONSTRUCTION TOTAL				$124,000.00
DESIGN AND CONTRUCTION SERVICES	25%			$31,000.00
CONTINGINCIES	20%			$24,800.00
TOTAL PROJECT				$179,800.00