

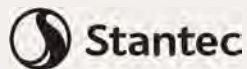
# DRAFT ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES AND CH. NR 722 REMEDIAL ACTION OPTIONS REPORT

**Phase 4 Redevelopment Area  
River Point District, Manitowoc, Wisconsin**

**1102 Chicago Avenue**

BRRTS ID: 02-36-585491 (Open ERP) and 07-36-583000 (LGU)

ACRES ID: 239716, 239717, and 239719



Prepared for:  
City of Manitowoc  
900 Quay Street

October 4, 2024

Prepared by:  
Stantec Consulting Services, Inc.


Project/File:  
193709902

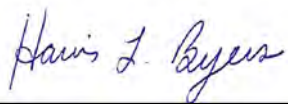
**DRAFT - Analysis of Brownfield Cleanup Alternatives**

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## GENERAL INFORMATION

<b>FACILITY</b>	Phase 4 Redevelopment Area, River Point District; Manitowoc, Wisconsin
<b>PARCEL IDs (All or Portions of)</b>	173000, 173001, 173002, 173010, and 173170
<b>SIZE</b>	3.4-acres
<b>USEPA ACRES ID (All or Portions of)</b>	239716, 239717, and 239719
<b>WDNR BRRTS NOs.</b>	02-36-585491 (Open ERP) and 07-36-583000 (LGU Exemption/General Property)
<b>PROPERTY LOCATION</b>	SE ¼ of Section 19, Township 19 North, Range 24 East and the NE ¼ of the NE ¼ of Section 30, Township 19 North, Range 24 East, Manitowoc, Manitowoc County, Wisconsin
<b>RESPONSIBLE PARTY (PROPERTY OWNER)</b>	Community Development Authority of the City of Manitowoc City of Manitowoc 900 Quay Street Manitowoc, WI 54220-4543  c/o Mr. Adam Tegen Community Development Director Phone: (920) 686-6931 Email: ategen@manitowoc.org
<b>CONSULTANT</b>	Stantec Consulting Services, Inc. 12080 Corporate Parkway, Suite 200 Mequon, Wisconsin 53092  c/o Harris Byers, Ph.D. Sr. Brownfields Project Manager Phone: (414) 581-6476 Email: harris.byers@stantec.com
<b>WDNR OVERSIGHT</b>	Wisconsin Department of Natural Resources Green Bay Service Center 2984 Shawano Avenue Green Bay, Wisconsin 54313  c/o Mr. Tauren Beggs Hydrogeologist Program Coordinator Phone: 920-510-3472 Email: Tauren.Beggs@wisconsin.gov



# 1 EXECUTIVE SUMMARY

Stantec Consulting Services Inc. (Stantec) completed this Analysis of Brownfields Cleanup Alternatives (ABCA) on behalf of the City of Manitowoc (hereinafter referred to as the City) and the Community Development Authority of the City of Manitowoc (CDA; current owner) for the “Phase 4 Redevelopment Area” of the River Point District at 1102 Chicago Street in the City of Manitowoc, Wisconsin (herein referred to as the “Site”). The Site consists of all or portions of five contiguous parcels of land owned by the CDA totaling approximately 3.4 acres. The locations of the River Point District and the Phase 4 Redevelopment Area are illustrated on **Figure 1** and **Figure 2**. Although street numbers have not yet been established, the current working Site address (1102 Chicago Street) is reflective of the proposed reuse, which places future buildings on the north side of an extension of Chicago Street.

This ABCA was prepared utilizing the framework provided in ch. NR 722 Wisconsin Administrative Code (WAC) (NR 722) for a Remedial Action Options Report (RAOR). The United States Environmental Protection Agency (USEPA) Assessment, Cleanup and Redevelopment Exchange System (ACRES) identification numbers associated with the Site are 239716, 239717, and 239719.

As documented in multiple phases of assessment completed by Stantec (i.e., Stantec, 2019-2024), volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), Resource Conservation and Recovery Act (RCRA) metals and amenable cyanide are present in soil at concentrations greater than established Chapter NR 720 WAC residual contaminant levels (RCLs) and/or background threshold values (BTVs) at the Site. The source of residual impacts is largely attributable to the black granular fill unit in combination with smaller diffuse releases from industrial uses on and adjacent to the Site.

In addition, VOCs, PAHs, and amenable cyanide were present at concentrations greater than their respective Chapter NR 140 WAC Preventative Action Limits (PALs) and Enforcement Standard (ESs). Residual VOC and PAH impacts are likely attributed to documented historic bulk petroleum storage releases migrating northward from the south-adjointing property. The source of residual amenable cyanide impacts appears attributable to fill materials on the east end of the Site and/or as migrating groundwater impacts from the former manufactured gas plant operations on the east-adjointing property.

Concentrations of individual and/or combined PFAS constituents in groundwater were greater than their respective proposed ES concentrations on the Site, however, the source of PFAS impacts has not been confirmed.

Remedial action activities are warranted to facilitate redevelopment at the Site. Specific to this ABCA, the selected remedial approach includes:

- Excavation, transportation, and offsite disposal of heavy metal, VOC, and/or PAH impacted fill disturbed during development;
- Construction of a engineered barriers in the rights of ways (ROWs) consisting of hardscape surfaces (i.e., concrete, asphalt), and/or landscaped areas to mitigate the potential for direct



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### **EXECUTIVE SUMMARY**

contact with residual soil impacts and reduce the risk for mobilization of soil impacts to groundwater;

- Construction of an engineered soil barrier along the Manitowoc River to mitigate the risk for direct contact with impacted soil/fill, reduce the risk of mobilization of soil/fill impacts to the river through stormwater runoff, and reduce the potential for leaching of residual impacts to groundwater.
- Establishing institutional controls/continuing obligations and maintenance plans to provide for long-term control of residual soil and groundwater impacts in proposed rights of ways.

Following completion of remedial work described in this ABCA, the City will sell the portion of the Property targeted for construction of townhomes to a developer. Additional remedial actions associated with private development not described in this ABCA will likely include:

- Excavation, transports and offsite disposal of impacted fill disturbed during future construction (e.g., excavation of foundation systems, installation of utilities, etc.);
- Design and construction of additional hardscape and landscape engineered barriers;
- Design and construction of sub-slab depressurization systems beneath newly constructed buildings to mitigate the risk for vapor intrusion; and
- Establishing institutional controls/continuing obligations and maintenance plans to provide for long-term control of residual soil, groundwater, and/or vapor impacts.



## 2 BACKGROUND INFORMATION

Stantec completed this ABCA on behalf of the City and the CDA for the “Phase 4 Redevelopment Area” utilizing the framework provided in NR 722 for a Remedial Action Options Report RAOR. The Phase 4 Redevelopment Area consists of all or portions of five contiguous parcels of land owned by the CDA totaling approximately 3.4 acres and forming the northern portion of the larger 21-acre former railroad/industrial peninsula referred to locally as the “River Point District”. The locations of the River Point District and the Phase 4 Redevelopment Area are illustrated on **Figure 1** and **Figure 2**. The delineation of the Phase 4 Redevelopment Area coincides with planned redevelopment activities in 2025. Although street numbers have not yet been established, the current working Site address (1102 Chicago Street) is reflective of the proposed reuse, which places future buildings on the north side of an extension of Chicago Street. As illustrated on **Figure 3**, the River Point District was recently rezoned “B-4 Central Business” with a Planned Unit Development to facilitate non-industrial redevelopment.

**It is critical to realize that work proposed under this ABCA does not duplicate cleanup work previously completed in the River Point District using funds from a cleanup loan provided to the CDA from the City’s FY13 USEPA Brownfield RLF program. In addition, work proposed under this ABCA does not duplicate cleanup work funded under USEPA Brownfield Cleanup Grants awarded to the City of Manitowoc in 2022 and 2023 under Cooperative Agreements BF00E03197 and BF00E03197, respectively.**

### 2.1 HISTORIC SITE USE/OCCUPANCY

As described in the Stantec (2019) Phase I ESA, the Site appears undeveloped in 1835; however, the proximity of the peninsula to the Lake Michigan/Great Lakes shipping route facilitated initial large scale industrial transloading development of the River Point District by 1868 with expanded industrial, commercial, and residential development between 1868 and 1883. Although ownership records are not available, a panoramic map drawn in 1883 indicates the River Point District was fully developed and occupied by several large industrial-like buildings and smaller commercial-like buildings.

In addition to railroad infrastructure, historic uses of the River Point District by previous owners/tenants have included ship building, lumberyards, warehouses, blacksmiths, a smoke house, carpet weaving, an iron/metal scrap yard, a grain elevator, parking, multiple bulk petroleum storage/distribution yards, and transloading yards for stone or coal. The historic uses and occupancies of the Site in the 19th Century and 20th Century are depicted on **Figure 4a** and **Figure 4b**, respectively. Associated PINs (illustrated on **Figure 2**) are summarized below.

#### Past Tenants and Site Uses – PIN 173001 and 173010

The Site was developed as the “Jones Saw Mill” between 1835 and 1868, which was renamed the “Hansen and Scove Saw Mill” by 1883. The Site was platted as individual parcels by 1878, presumably for



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### **2 BACKGROUND INFORMATION**

residential/commercial use as an extension of the downtown street grid and historic maps confirm at least three buildings were present at the Site by 1894 (**Figure 4a**).

The Site was redeveloped as a coal transloading yard in the late 19th Century concurrent with the redevelopment of the River Point District for railroad use in the late 19th Century (**Figure 4b**). Sanborn® Fire Insurance Maps indicate the coal storage/transloading facility operated as the “Wisconsin Central RR Coal Dock” by the “C. Reiss Coal Co.” through at least 1945. The “Goodrich Transit Co.” used the bulkhead line of the Manitowoc River in 1919 for winter storage of three steam ships (S.S. Christopher Columbus, S.S. Florida, and the S.S. Arizona).

Historic orthophotographs indicate the western half of the Site was redeveloped for use as automotive parking by 1946. Although records are sparse, the parking area appears to have been leased to the “Manitowoc Ship Building Company”. Historic orthophotographs suggest the western portion of the Site was used for automotive parking through at least 1976.

Assessor records indicate bulk of the Site was leased to the “Laird Lumber Company” in December 1950 (**Figure 4b**), who subsequently constructed the four remaining buildings/sheds onsite through 2024 (Buildings A through D) plus two sheds (Buildings 4 and 5) that were razed by 1988 (**Figure 4b**). Assessor records indicate the lease was transferred to the “Braun Building Company” by 1969, who has operated a millwork truss assembly facility and has utilized the Site for outdoor lumber/material storage into the 21<sup>st</sup> Century.

#### Past Tenants and Site Uses – PIN 173002

Approximately 0.01 acres on the far southeastern corner of the Site was leased to the “Wisconsin Fuel and Light Company” in 1986, which was later renamed “Wisconsin Public Service Commission” (**Figure 4b**). No buildings or industrial uses were apparent on this portion of the Site by the Wisconsin Fuel and Light Company (or their subsequent entities).

#### Past Tenants and Site Uses – PIN 173000 and 173170

The Site includes small portions of two larger PINs (173000 and 173170), which appear to have served as rights of way to deliver bulk petroleum to the storage facilities located adjacent to and immediately south of the Site. These portions of the Site remained in railroad use through most of the 20<sup>th</sup> Century (**Figure 4b**).

#### **Site Ownership**

Historic records indicate the Site was transferred from the Manitowoc Terminal Company to the Manitowoc and Western Railroad Company on July 22, 1895, which is consistent with railroad development in the late 19th Century. Assessor records suggest the Site was later transferred to the Soo Line Railroad Company and ultimately transferred to Wisconsin Central, Ltd. (WCL) sometime during the latter half of the 20th Century. Railroad use of the Site ceased in the 1980s and the Site was decommissioned in the 2000s. The CDA acquired the Site on April 12, 2019 for the purpose of blight elimination and subsequently received a Local Government Unit (LGU) Environmental Liability Exemption from WDNR on March 18, 2019 with a BRRTS activity number of 07-36-583000.





The CDA maintained the lease to the Braun Building Company, who has continued to operate a wooden truss assembly operation in Building D while storing structural lumber in Buildings B and C (**Figure 4c**). The warehouse and office building (Building A; **Figure 4c**) was formerly subleased to McMullen and Pitz for boat and equipment storage.

In April 2024, Buildings A and B were demolished to facilitate new construction of the Chicago Street rights-of-way (Stantec, 2024c). Removal of these structural impediments additionally allowed subsurface investigation activities to occur in areas that were previously inaccessible. Buildings C and D remain in use on the Site by Braun Building Company but are intended to be decommissioned by late Fall 2024.

Since taking ownership, the CDA has maintained compliance with the required continuing obligations and no records have been identified indicating the CDA is considered potentially liable or known to be affiliated with any other person that is potentially liable for contamination at the Site.

## **2.2 ENVIRONMENTAL SITE INVESTIGATIONS**

The following provides a summary of previous environmental investigations conducted by Stantec between 2018 and 2024. A considerable number of soil borings and monitoring wells were completed in a phased approach at the River Point District since 2018. The sample locations are illustrated on **Figure 5**.

### **Stantec (2019) Phase I ESA, River Point District**

The Stantec (2019) Phase I ESA completed at the greater River Point District identified the following recognized environmental conditions (RECs) applicable to the Site:

- Prior Railroad Use
- Prior Industrial Use
- Residual Impacts to Soil and Groundwater
- Apparent Anthropogenic Fill
- Residual Impacts to Soil and Groundwater from Nearby Properties

### **Phase II ESAs, Construction Documentation Reports and Site Investigations**

Stantec (2020 through 2024d) completed multiple phases of investigation including Phase II ESAs, Construction Documentation Reports, and Site Investigations at the River Point District using funds from multiple brownfield assessment grants awarded to the City by the USEPA and/or the Wisconsin Economic Development Corporation (WEDC).

A total of 11 soil borings (SB-1 through SB-9, SB-11, and SB-12), six temporary monitoring wells (TW-1, TW-7 through TW-9, TW-11, and TW-12) and six permanent groundwater monitoring wells (MW-1 through MW-6) were completed at the Site in a phased approach at the River Point District between 2018 and 2019 as summarized in the Stantec (2020) Phase II ESA. Select VOCs, SVOCs/PAHs, and RCRA metals were detected in soil at concentrations greater than applicable ch. NR 720 WAC RCLs and/or BTVs across the Site. These constituents of concern (COCs) became the focus for subsequent phases of work at the Site. The Stantec (2020) Phase II ESA identified multiple fill units, including a sitewide heterogeneous granular black anthropogenic fill unit of varying quality. Ubiquitous PAH and metals soil impacts were largely attributable to the granular anthropogenic fill across the Site, which is present in thicknesses of up to eight



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feet in some portions of the River Point District property (**Figure 6**). Previously documented soil impacts associated with prior bulk petroleum storage by previous tenants on the south-adjointing property (**Figure 4b**) were also confirmed.

In addition, select VOC and PAH constituents were detected at concentrations greater than their respective ch. NR 140 WAC PALs and ESs on the Site, and dissolved RCRA metals were detected in groundwater at concentrations greater than applicable PALs. These COCs became the focus for subsequent phases of work at the Site. Impacts to groundwater adjacent to the former bulk petroleum storage areas were consistent with previous investigations. PFAS was detected in groundwater at the Site at concentrations greater than the proposed individual and combined constituent PALs and/or ESs; this was also the case for the greater River Point District property.

From June 2023 through July 2024, Stantec conducted additional soil and groundwater sampling activities to further characterize subsurface materials and groundwater quality at the Site and plan for future non-industrial redevelopment per the Stantec (2023a) Site Investigation Workplan (SIWP) dated April 7, 2023, with notice to proceed issued by WDNR on April 17, 2023 (WDNR, 2023). As part of this investigation, 75 soil borings, 13 temporary monitoring wells, and 20 permanent groundwater monitoring wells were installed at the Site and sampled for one or more constituents (Stantec, 2024d). The results of the additional investigation were consistent with the Phase II ESA.

Soil. Laboratory analytical results indicate that VOCs, PAHs, RCRA metals and amenable cyanide are present in soil at concentrations greater than established regulatory standards at the Site. The source of residual impacts is largely attributable to the black granular fill unit in combination with smaller diffuse releases from industrial uses on and adjacent to the Site. The vertical and horizontal extents of the fill unit area are illustrated on **Figure 6**. A spatial model of **Figure 6** estimates there are 14,400 cubic yards of granular fill at the Site. The extents of soil contamination associated with presumed liquid spills/release at the Site are illustrated on **Figure 7**.

Groundwater. The potentiometric surface of shallow groundwater grades downward in a radial manner towards the Manitowoc River, which serves as a constant head boundary for groundwater. Shallow groundwater was generally measured to be within six feet of the ground surface and flow north-northwest to the Manitowoc river. The groundwater table is illustrated on **Figure 8**. In groundwater, VOCs, PAHs, RCRA metals and amenable cyanide were present at concentrations greater than their respective ch. NR 140 WAC PALs and ESs. Residual VOC and PAH impacts are attributed to documented historic bulk petroleum storage releases on the south-adjointing property. The source of residual amenable cyanide impacts is attributed to fill materials containing coal tar leaching to groundwater on the east end of the Site, as well as former manufactured gas plant operations on the east-adjointing property. Dissolved arsenic was present across the Site at concentrations greater than the NR 140 PAL, which is consistent with concentrations observed within the greater River Point District and likely attributable to naturally occurring sources weathering in the underlying alluvium. Concentrations of individual and/or combined PFAS constituents in groundwater were greater than their respective proposed ES concentrations on the Site, and in some instances may be migrating onsite from an offsite source. The extent of groundwater contamination at the Site is illustrated on **Figure 9**.



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Vapor Intrusion. There are currently no structures with human occupancy on the Site in areas with identified VOC impacts to soil or groundwater (**Figures 7 and 9**); therefore, the vapor intrusion pathway is not currently a pathway of concern. However, future buildings are planned as part of redevelopment, including on the east end of the Site where VOC impacts are documented in soil and groundwater. As a conservative measure, future buildings that will be constructed may include a SSDS that can be made active if post-construction sub-slab vapor sampling indicates the risk for vapor intrusion. Neighboring occupied buildings are not at risk from vapor migration given their distance from VOC impacts, and no vapor intrusion would result from the movement of contaminated soil within the confines of the Site during redevelopment.



## 3 REMEDIAL ACTION OPTIONS EVALUATION

### 3.1 PROPOSED PROPERTY REDEVELOPMENT

The redevelopment of the River Point District has been part of the vision for the City for well over 20 years. More recently, the 2009 Comprehensive Plan targets redevelopment of the Target Area from Industrial to Planned Mixed Use. Also in 2009, the City adopted the Port of Manitowoc, Downtown & River Corridor Master Plan. Within that plan, the Site was shown as a redevelopment site. A third plan related to the path extension was adopted in 2009, Manitowoc Riverwalk Master Plan and Design Guidelines. The importance of the peninsula portion of the river walk was covered extensively in the document as was the overall River Point District. In 2019, the City adopted a Downtown Master Plan with the peninsula redevelopment identified as one of four catalyst sites for redevelopment. The North Central River District Redevelopment Plan is substantially complete and focuses specifically on redevelopment of the Site. The City Council approved moving forward with design and construction documents for the necessary infrastructure to redevelop the peninsula, and the first phase of redevelopment began in Spring 2021.

Future public infrastructure investments at the River Point District will include streets, trails, utilities, lighting, and streetscape of over \$15M. It is estimated that the installation of the public improvements will lead to a mix of private investments ranging from residential condos and apartments to commercial and mixed-use buildings with a value of up to \$180M. With over 3,500 feet of river frontage, redevelopment of the River Point District also nearly doubles public pedestrian access to the Manitowoc River through trails and key nodes intended to serve as overlooks, trailheads and river access points to enhance connection to the river and the natural environment. The overall River Point District redevelopment also offers the unique distinction of being located immediately adjacent to the existing downtown core furthering the potential economic impact of the project. City support for the project includes acquisition of the property in 2019, infrastructure design and construction that are currently underway, brownfield assessment and cleanup, establishment of a new Tax Incremental Financing District and site preparation.

As previously stated, the 3.4-acre Phase 4 Redevelopment Area is part of the larger 20.1-acre River Point District Redevelopment Project. Conceptual redevelopment plans for the Phase 4 Redevelopment Area are provided in **Appendix A** and are illustrated on **Figure 10**. Future site features will include townhomes and surrounding rights of ways (ROWs), which includes the continuation of the river side multimodal asphalt trail, two park spaces, amphitheater, and an extension of Chicago Street. A bioretention pond is proposed on the northwestern portion of the Site in addition to native landscaping and trees programmed along the trail. The northwestern park will be an overlook of the Manitowoc River and includes a flexible use lawn space, walkways, and river edge deck anchored to the existing bridge abutment pier. The eastern park includes stone terraced seat walls, a shade structure at the lower level of the terraced walls, low mow fescue seeding, transition of the on-street Chicago Street bike line to multiuse trail, bike parking, and an ADA access walk for move from the top of the terraces to the bottom of the terraces. A sheet pile wall will be extended along the eastern Site boundary nearby the park to stabilize the slope in the area. The Chicago Street ROW expansion will include landscaping in addition to the concrete roadway and sidewalk with new utilities/infrastructure installed beneath the driving surfaces.



## **3.2 CLEANUP STANDARDS AND APPLICABLE LAWS**

Although the City has an LGU exemption granted under ch. 292.11(9) WAC, remedial activities proposed under this ABCA will be completed per the requirements of ch. NR 700 WAC. The WDNR will provide regulatory oversight of the project, including reviewing/approving plans and reports described in Section 4 of this ABCA.

Cleanup soil quality standards are established in ch. NR 720 WAC and groundwater quality standards are established in ch. NR 140 WAC. Criteria for beneficial reuse of soil/fill at the Site are established under ch. NR 718 WAC. Toxicity thresholds specified in 40 CFR 261 will be used to determine proper waste/material management. Impacted soil/fill generated during excavation will be managed per ch. NR 600 WAC and ch. NR 500 WAC. The portion of project adjacent to the Manitowoc River will be permitted under ch. 30 Wis. Stats.

## **3.3 REMEDIAL ACTION OPTIONS EVALUATION**

Based on impacts identified to date, remedial action activities are warranted to facilitate redevelopment at the Site as described in Section 3.2. An evaluation of three remedial options was conducted utilizing criteria presented in ch. NR 722.07(4) WAC and ch. NR 722.09(2m) WAC to address legacy environmental impacts to facilitate redevelopment for non-industrial purposes. As summarized on **Table 1**, the remedial options evaluated under this ABCA included the following:

1. Natural Attenuation (no action).
2. Excavate all impacted soils and transport offsite for disposal at a licensed solid waste landfill; backfill with clean fill materials to final grade; stabilize/replace sheet pile wall instability caused by excavation; and establish an institutional control to manage residual groundwater impacts.
3. Limited excavation and offsite disposal of impacted fill; constructing engineered barriers in the ROWs to minimize direct contact with impacted soil/fill and reduce potential for leaching of residual impacts to groundwater; and establishing institutional controls/continuing obligations and maintenance plans to provide for long-term control of residual soil and groundwater impacts (future).

In general, each remedial option is considered technically feasible; however, the short-term and long-term effectiveness of each remedial option's capability to be protective of public health, safety, or welfare or the environment, reasonableness of the alternative, the resilience to address potential adverse impacts caused by extreme weather events, and the cost associated with each approach varies greatly.

Alternative 1. Although the cost to implement remedial Alternative 1 is the least of the three options, constituents associated with residual impacts are considered recalcitrant to natural attenuation. The overall magnitude, mobility, and toxicity of impacts would not decrease, and Site restoration will not occur within a reasonable timeframe. Following redevelopment, impacts would be near sensitive receptors and impacts



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### 3 REMEDIAL ACTION OPTIONS EVALUATION

could be mobilized during extreme weather events. Therefore, Remedial Alternative 1 is not considered a prudent approach.

Alternative 2. Excavation and offsite disposal of impacted soils proposed in Alternative 2 will be effective in long-term elimination of the mobility, toxicity, and magnitude of residual soil impacts and would not be impacted by extreme weather events due to climate change. However, the cost for Alternative 2 is excessive (estimated to be over \$8MM). Alternative 2 will require hauling a considerable volume of soil for disposal in a landfill (estimated 14,400 cubic yards) and require an equal volume of clean fill to be imported to the Site just to bring the Site back to current grade. Further, the required excavation would remove material from the sheet pile wall tie backs and adversely impact the effectiveness of the already deteriorating wall. Therefore, the deteriorating sheet pile wall would likely need to be reinforced and/or replaced. Reinforcing and/or replacing the sheet pile wall would likely result in an excessive cost based on the current observed extent of the deteriorating conditions. Therefore, despite the effectiveness, Alternative 2 is not considered a cost-effective option.

Alternative 3. Based on the current deteriorating condition of the sheet pile wall, slope layback along the riverfront is necessary to achieve a stable slope and protect public safety and the development integrity. Based on the soil conditions and allowable operating area on the northeastern portion of the Site, slope layback is not anticipated to be a viable option to achieve stable ground conditions in the area. Therefore, a 28-foot-long sheet pile wall is planned to be installed along the eastern boundary of the Site following remedial excavation. Contaminated fill material will be encountered during the slope layback and sheet pile wall installation. In addition, contaminated fill will be encountered during building foundation construction and utility line installation in the Chicago Street ROW. A total of approximately 8,445 cubic yards (CY) of impacted fill material will be excavated and transported offsite for disposal at a licensed solid waste landfill as part of slope stabilization, building foundation construction, ROW installation, and site grading. The excavations will be backfilled with imported fill material to meet the proposed grades. The extent of cut and fill associated with the development is illustrated on **Figure 11**.

Engineered barriers in the ROWs consisting of concrete, pavement, building foundations, rip rap, and/or landscaping will be constructed to minimize direct contact with impacted soil/fill and reduce potential for leaching of residual impacts to groundwater. The extent of the site cover system is illustrated on **Figure 10** and shown in detail in **Attachment A**.

To reduce the footprint of Alternative 3, petroleum-impacted soil may be placed on the biopile at the solid waste landfill and later reused by the landfill. Energy and fuel use would be minimized; however, local infrastructure (roads) could be impacted during importation of soil; however low sulfur diesel can be used and a no-idle policy will reduce the carbon footprint. Pending the results of sampling and WDNR concurrence, clean fill could be sourced from nearby municipal road projects and/or local construction projects which would lessen the carbon footprint of the project and reuse unwanted fill.

Remedial Alternative 3 will cost-effectively provide for long-term reduction in the mobility, toxicity, and magnitude of impacts, including potential impacts to the Manitowoc River from climate change. Institutional controls will provide for long-term maintenance of the engineered barriers in the ROWs and will prevent groundwater consumption. Remedial Alternative 3 is considered the most reasonable and cost-effective



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approach to facilitate proposed redevelopment. Remedial Alternative 3 is the selected remedial alternative based on its short-term and long-term effectiveness, ability to be implemented within the proposed development, restoration time frame, economic feasibility, resilience to climate impacts, and sustainability.



## 4 SELECTED REMEDIAL ACTION OPTION

### 4.1 SELECTED REMEDIAL ACTION OPTION

The selected remedial action option is comprised of eight elements which are described below.

**Waste Characterization Sampling.** Representative samples of soil targeted for offsite disposal will be collected and submitted to an analytical laboratory for waste characterization. Based on the results of the sampling, one or more waste profiles will be established with a licensed solid waste landfill.

**Develop a Remedial Action Plan / Material Management Plan; Historic Fill Exemption; and ch. 718 Exemption Request.** A combined remedial action plan (RAP) and material management plan (MMP) will be completed and submitted to WDNR for approval. The RAP/MMP will describe the soils targeted for use in the engineered barriers in the ROWs (e.g., quality, placement location, placement depth, etc.) and outline contingency plans for managing fluids (e.g., infiltrated groundwater, stormwater, etc.) and/or other materials encountered during construction. A Historic Fill Exemption (HFE) and ch. NR718 Exemption request will be prepared and submitted to WDNR for approval.

**Cleanup - Excavation and Offsite Disposal of Impacted Soils.** The Site will be cleared and 8,445 cubic yards of contaminated soil will be excavated and transported offsite for disposal at a licensed solid waste landfill; pending landfill approval. Select soil with perceived petroleum impacts may be placed on the landfill biopile to allow natural attenuation of residual petroleum impacts. Remediated soil will likely remain in the landfill for beneficial reuse.

A 28-foot-long sheet pile wall is planned to be installed along the eastern boundary of the Site following excavation to stabilize the development in the area and be protective of public safety. The excavations will be backfilled with imported fill material to meet the proposed grades. The extent of cut and fill associated with the development is illustrated on **Figure 11**.

#### **Cleanup – Construction of Engineered Barriers in ROWs (Hardscape Caps)**

Hardscape engineered barriers will be constructed over the portions of the ROWs where impacted soils remain. As detailed on **Table 2**, hardscape engineered barriers will include:

- 2,200 tons of stone rip rap placed along the riverfront slope to stabilize the slope and armor the Site from erosion, which could be exacerbated by climate change;
- 2,670 square yards of concrete pavement for the Chicago Street roadway;
- 9,945 square yards of concrete for sidewalks; and
- 240 square yards of aggregate for trails.

#### **Cleanup – Construction of Engineered Barriers in ROWs (Landscape Caps)**

Landscape-based engineered barriers will be constructed over the portions of the ROWs where impacted soils remain. Approximately 12,199 cubic yards of clean fill and 3,302 yards of clean topsoil will be imported to the Property and finished in turf and native grasses/forbs.

#### **Construction Documentation Report**





**DRAFT Analysis of Brownfield Cleanup Alternatives**  
**4 SELECTED REMEDIAL ACTION OPTION**

A construction documentation report will be prepared following completion of the remedial actions described above.

**Establish Institutional Controls**

Following construction of the engineered barriers in the ROWs, the Site will be listed on the WDNR Geographic Information System (GIS) Registry. The listing will serve as a continuing obligation/institutional control to restrict groundwater consumption and restrict disturbance of the engineered barrier. The GIS Registry will provide for notification of residual impacts to soil and groundwater and will include an annual engineered barrier maintenance plan.

**Engineering, Permitting, Program Management, and Community Outreach**

Engineering and design services, procurement of necessary permits to complete the proposed cleanup activities, onsite oversight of contractor work, and community outreach activities will be performed.

## **4.2 SCHEDULE**

A proposed schedule for the implementation of Remedial Alternative 3 is presented on the table below. The schedule assumes USEPA approves a request to start work in early July 2025.

*Anticipated Schedule for Remedial Alternative 3*

<b>Task #</b>	<b>Task Description</b>	<b>Weeks to Complete</b>
1	Waste Characterization Sampling.	3 weeks, to be completed in Summer 2025
2	Prepare RAP/MMP; HFE; and 718 Exemption Request	2 weeks following completion of Task 1
3	Cleanup - Excavation and Offsite Disposal of Impacted Soils.	2-4 Weeks, depending on construction schedule, to be completed in late Fall 2025
4	Cleanup – Construction of Engineered Barriers in ROWs (Hardscape Caps)	6-8 Weeks, depending on weather and availability of materials, to be completed by Spring 2026
5	Cleanup – Construction of Engineered Barriers in ROWs (Landscape Caps)	2-4 Weeks, to be completed by Summer 2026
6	Construction Documentation Report	1-2 Weeks following completion of Task 1-5, to be completed by Fall 2026
7	Establish Institutional Controls	1-2 Weeks following completion of Task 6, to be completed by Winter 2026
8	Engineering, Permitting, Program Management, and Community Outreach	Duration of Remedial Alternative 3 (Anticipated to be up to 17 months)



### **4.3 ESTIMATED COST**

A preliminary estimate of the total cost for implementation of Remedial Alternative 3 is presented on the table below. The work will be completed under a FY2025 USEPA Brownfield Cleanup Grant (Cooperative Agreement Pending).

*Cost Estimate for Remedial Alternative 3*

<b>Task #</b>	<b>Item</b>	<b>Potential Cost</b>
1	Waste Characterization Sampling.	\$25,000
2	Prepare RAP/MMP; HFE; and 718 Exemption Request	\$25,000
3	Cleanup - Excavation and Offsite Disposal of Impacted Soils	\$1,483,028
4	Cleanup – Construction of Engineered Barriers in ROWs (Hardscape Caps)	\$741,506
5	Cleanup – Construction of Engineered Barriers in ROWs (Landscape Caps)	\$567,471
6	Construction Documentation Report	\$15,000
7	Establish Institutional Controls	\$18,000
8	Engineering, Permitting, Program Management, and Community Outreach	\$290,000
<b>TOTAL</b>		<b>\$3,165,005</b>

### **4.4 RESTORATION TIMEFRAME**

As described in Section 4.2, implementation of Remedial Alternative 3 is anticipated to be initiated in Summer 2025 and be completed by Fall/Winter 2026.

### **4.5 PERFORMANCE MEASURES**

Performance measures such as excavation side wall sampling and post remedial soil and/or groundwater sampling are not anticipated as part of the proposed work at this time but could be conducted if requested by WDNR following agency review of the Stantec (2024d) Site Investigation Report.

### **4.6 TREATMENT RESIDUALS**

No additional treatment of residuals is anticipated as part of the proposed work.

### **4.7 SUSTAINABLE REMEDIAL ACTION CONSIDERATIONS**

The described remedial approach relies on offsite disposal of material not suitable for reuse at the Site. The direct contact exposure pathway in the ROWs will be further mitigated through the use of engineered



barriers consisting of multiple completed surfaces. This approach minimizes transporting of soil for offsite disposal in a landfill. Petroleum soils that are removed from the Site may be added to a biopile at the solid waste landfill to facilitate natural attenuation of residual impacts. Low sulfur diesel can be used, and a no-idle policy will reduce the carbon footprint.

## **4.8 ADDITIONAL REMEDIAL ACTIONS**

This ABCA evaluated a set of remedial actions to address residual soil and groundwater impacts within the Phase 4 Redevelopment Area. Work includes excavation, transport, and offsite disposal of a significant quantity of impacted fill not suitable for reuse onsite and includes construction of engineered barriers in the public ROWs.

Following completion of remedial work described in this ABCA, the City will sell the portion of the Property targeted for construction of townhomes to a developer. Additional remedial actions associated with private development not described in this ABCA will likely include:

- Excavation, transports and offsite disposal of impacted fill disturbed during future construction (e.g., excavation of foundation systems, installation of utilities, etc.);
- Design and construction of additional hardscape and landscape engineered barriers;
- Design and construction of sub-slab depressurization systems beneath newly constructed buildings to mitigate the risk for vapor intrusion; and
- Establishing institutional controls/continuing obligations and maintenance plans to provide for long-term control of residual soil, groundwater, and/or vapor impacts.



## **5 LIMITATIONS**

The conclusions in this report are Stantec's professional opinion, as of the time of the report, and concerning the scope described in the report. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. This report relates solely to the specific project for which Stantec was retained and the stated purpose for which the report was prepared. This report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from the City and the CDA and third parties in the preparation of this report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This report is intended solely for use by the City and the CDA in accordance with Stantec's contract with the City and the CDA. While this report may be provided to applicable authorities having jurisdiction and others for whom the City and the CDA is responsible, Stantec does not warrant the services to any third party. This report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec's discretion.



## **6 REFERENCES**

Stantec, 2019, 10th Street Railroad Property, Manitowoc, Wisconsin, Phase I Environmental Site Assessment, March 21, 2019.

Stantec, 2020, Phase II Environmental Site Assessment, Riverpoint District; Manitowoc, Wisconsin, March 23, 2020.

Stantec, 2021, NR 716 Site Investigation Report, River Point District Phase 1 Construction Area; Manitowoc, Wisconsin, July 19, 2021.

Stantec, 2023a, Site Investigation Workplan; Phase 3 Construction Area of the River Point District; Manitowoc, Wisconsin, April 7, 2023.

Stantec, 2023b, Site Investigation Report, River Point District Phase 2 Redevelopment Area; Manitowoc, Wisconsin, June 2, 2023.

Stantec, 2023c, PFAS Concentrations in Soil at the River Point District (BRRTS Case No. 07-36-583000), email correspondence from Harris Byers (Stantec) to WDNR, July 28, 2023.

Stantec, 2024a, Interim Construction Documentation Report – River Point Drive Rights of Way and Adjacent Future Multi-Family Residential and Commercial Parcels, Phase II Redevelopment Area, River Point District; Manitowoc, Wisconsin, January 19, 2024.

Stantec, 2024b, Pre-Demolition Asbestos-Containing Materials, Lead-Bearing Paint, and Hazardous/Restricted Waste Surveys, (4) Buildings in the Phase III Redevelopment Area of the River Point District, 1103 Chicago Street, Manitowoc, Wisconsin, January 29, 2024.

Stantec, 2024c, Summary of Building Demolition Activities, Phase 3 Redevelopment Area of the River Point District, Manitowoc, Wisconsin, May 1, 2024.

Stantec, 2024d, Site Investigation Report, River Point District Phase 3 Redevelopment Area; Manitowoc, Wisconsin, October 8, 2024.

WDNR, 2023, SSSAP for a Site Investigation in the Phase 3 Redevelopment Area of the River Point District in Manitowoc, Wisconsin, notice to proceed via email from WDNR to Harris Byers (Stantec), April 17, 2023.



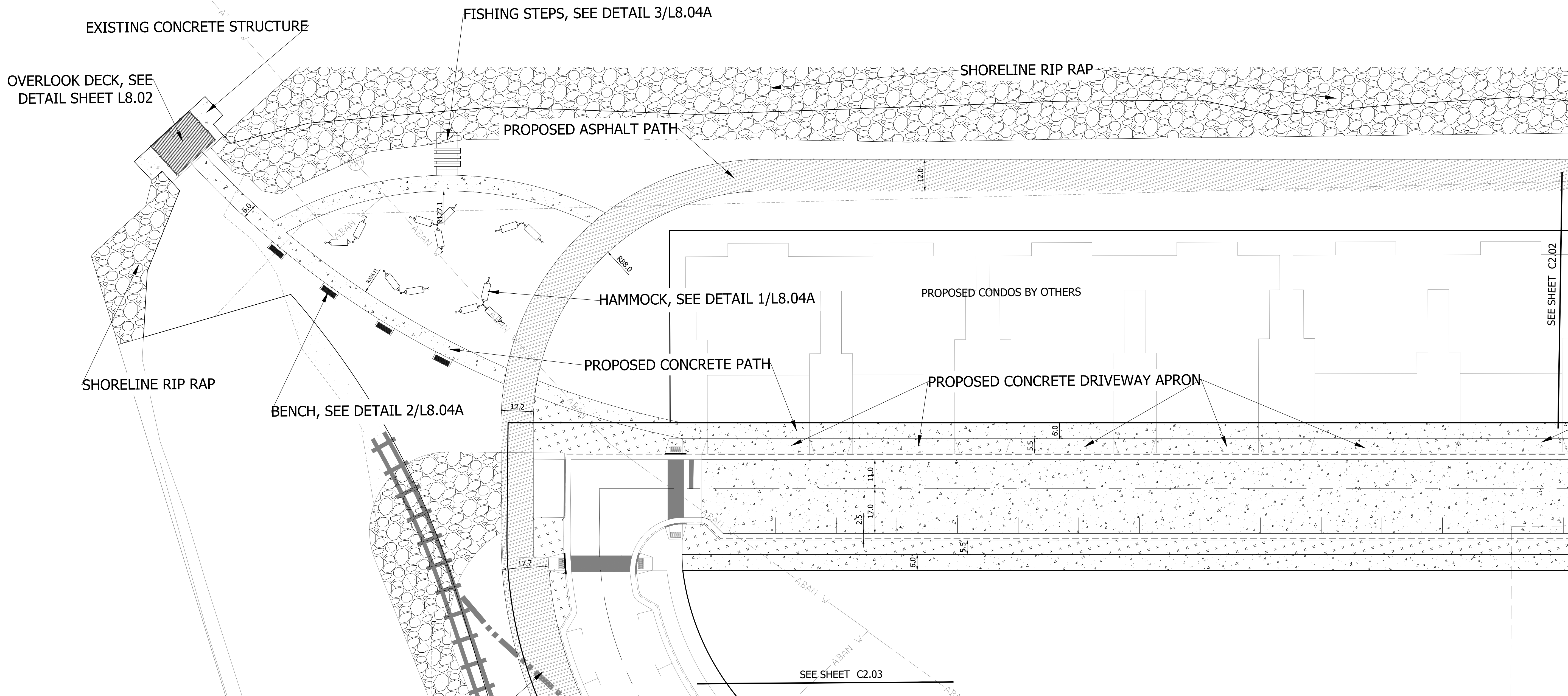
## APPENDIX A - PROPOSED REDEVELOPMENT PLANS




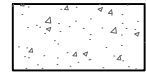

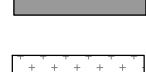






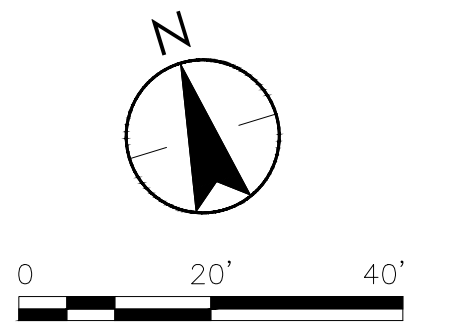
THE CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS. DO NOT SCALE THE DRAWING. ANY ERRORS OR OMISSIONS SHALL BE REPORTED TO STANTEC WITHOUT DELAY. STANTEC SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS MADE BY ANY OTHER PARTY FOR ANY PURPOSE OTHER THAN THAT AUTHORIZED BY STANTEC. IS FORBIDDEN.

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Sheet: 19380449\_C2.01.dwg  
User: ladd  
Title: 30% SET



**LEGEND**

-  PROPOSED ASPHALT
-  PROPOSED CONCRETE
-  PROPOSED COLORED CONCRETE
-  TURF SEED
-  STORM SEWER MANHOLE
-  STORM SEWER CATCH BASIN
-  SANITARY SEWER MANHOLE
-  ROW / PROPERTY LINES



SEE SHEET C2.02

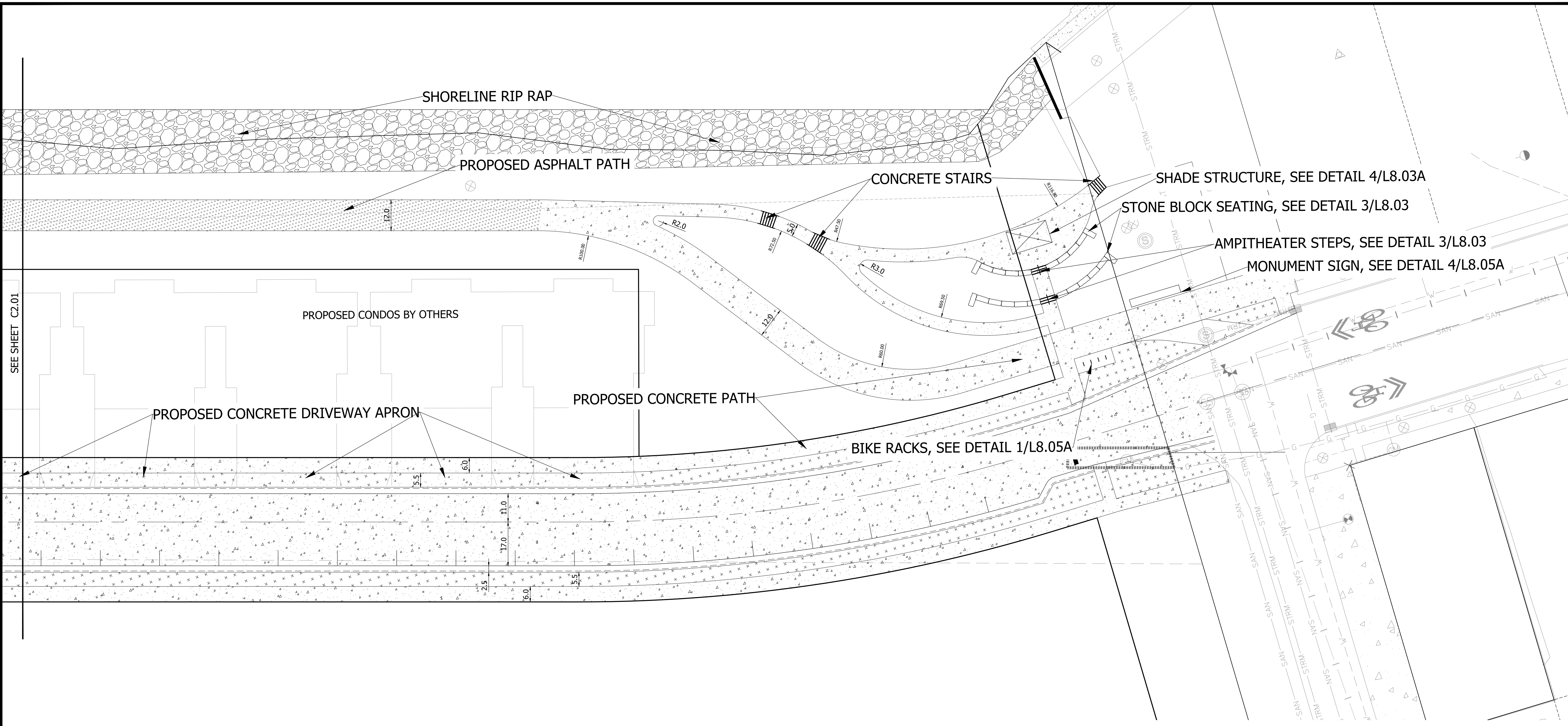
SITE PLAN  
RIVER POINT - PHASE 4  
CITY OF MANITOWOC  
MANITOWOC, WISCONSIN

DATE OF ISSUANCE	
09/20/2024	
NO. REVISION	DATE
1 30% SET	09/20/2024
SURVEY	CORNER POINT
DRAWN	KRM
DESIGNED	KRM
CHECKED	JAW
APPROVED	JAW
PROJ. NO.	190300042
SHEET NUMBER	C2.01



THE CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS. DO NOT SCALE THE DRAWING. ANY ERRORS OR OMISSIONS SHALL BE REPORTED TO STANTEC WITHOUT DELAY. REPRODUCTION OR USE FOR ANY PURPOSE OTHER THAN THAT AUTHORIZED BY STANTEC IS FORBIDDEN.

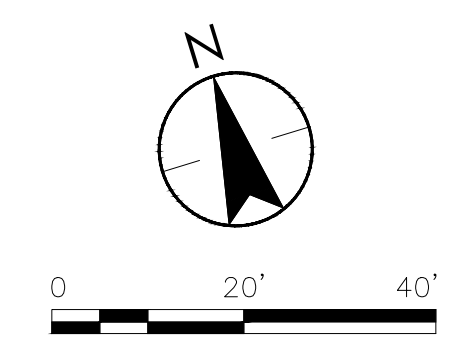
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SEE SHEET C2.01

**LEGEND**

- PROPOSED ASPHALT
- PROPOSED CONCRETE
- PROPOSED COLORED CONCRETE
- TURF SEED
- STORM SEWER MANHOLE
- STORM SEWER CATCH BASIN
- SANITARY SEWER MANHOLE
- ROW / PROPERTY LINES



DATE OF ISSUANCE	
09/20/2024	

NO.	REVISION	DATE
1	30% SET	09/20/2024

SURVEY	CORNER POINT
DRAWN	KRM
DESIGNED	KRM
CHECKED	JAW
APPROVED	JAW
PROJ. NO.	190300042

## **FIGURES**





Figure No.

1

Title

Redevelopment Area 4 and  
Regional Topography

Client/Project

Redevelopment Area 4



River Point District

City of Manitowoc

0 395 790

Feet

**Legend**

-  Redevelopment Area 4
-  River Point District



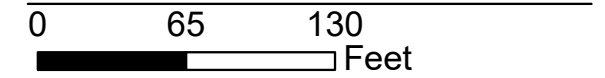
NOTE:  
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet  
2. Orthophotograph: Manitowoc County, 2020









Figure No.  
**2**  
 Title  
 Redevelopment Area 4 and  
 Site Layout

Client/Project  
 Redevelopment Area 4  
 River Point District  
 City of Manitowoc



**Legend**

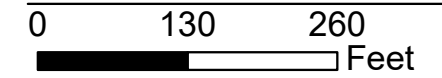
-  River Point District
-  Parcel Identification Numbers
-  Redevelopment Area 4
-  FY23 Brownfield Cleanup Grant Area



NOTE:  
 1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet  
 2. Orthophotograph: Manitowoc County, 2020












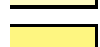








Figure No.  
**3**  
 Title  
**Redevelopment Area 4  
 and Zoning**  
 Client/Project  
 Redevelopment Area 4  
 River Point District  
 City of Manitowoc  
 Prepared by HLB on 4/15/2024



**Legend**



-  River Point District
-  Redevelopment Area
-  Parcels
- Zoning**
-  B-1 Office - Residential
-  B-2 Neighborhood
-  B-3 General
-  B-4 Central
-  C-1 Commercial
-  I-1 Light Industrial
-  I-2 Heavy Industrial
-  P-1 Conservancy
-  R-1 Residential -
-  R-2 Single Family
-  R-3 Single Family
-  R-4 Single and Two Family
-  R-5 Low Density Multiple Family
-  R-6 Multiple Family
-  R-7 Central

Notes  
 1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet  
 2. Orthophotograph: Manitowoc County, 2020

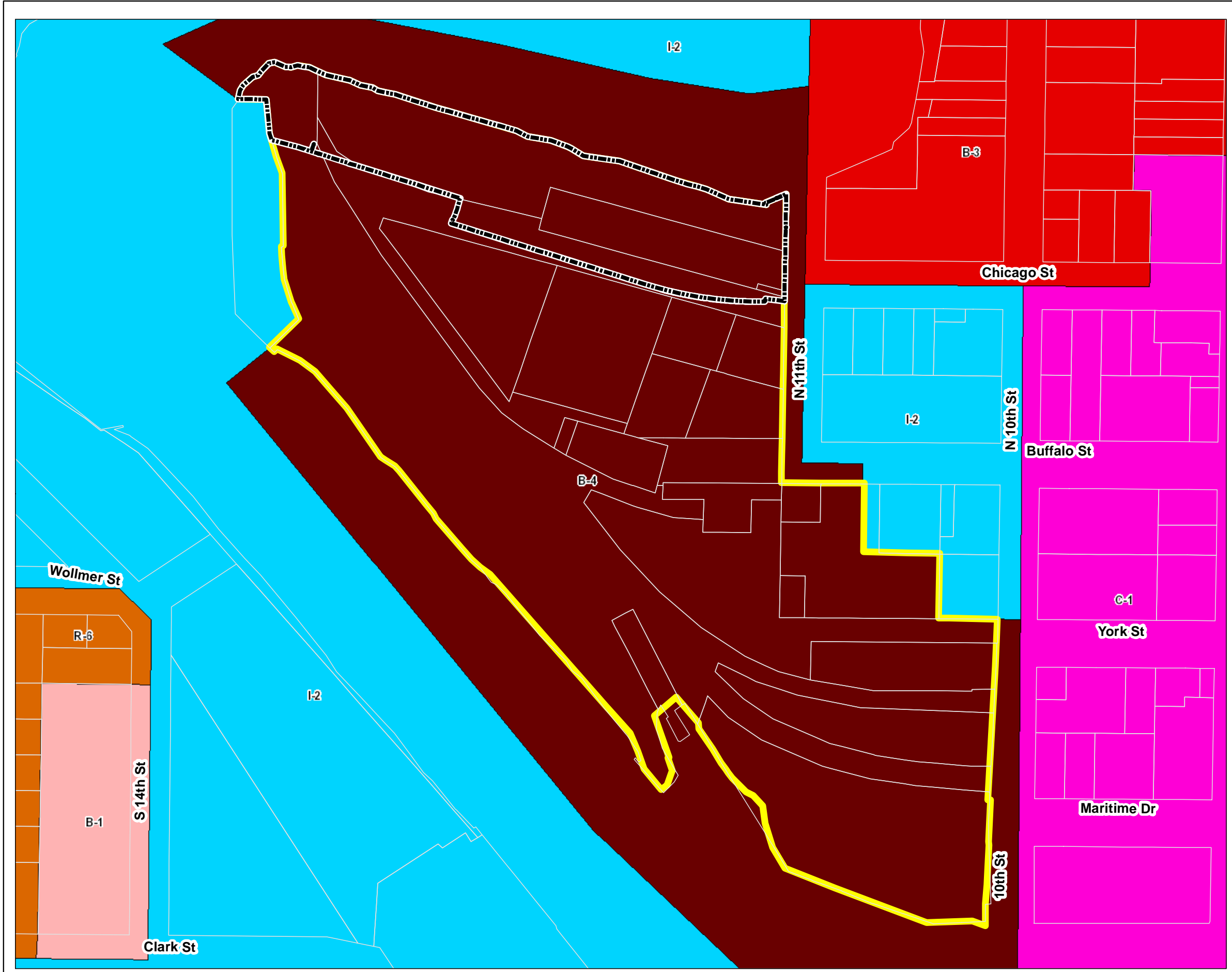
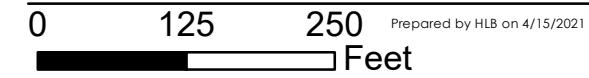


Figure No. **4a**  
 Title  
**Historic Site Features (19th Century)**

Client/Project  
 Redevelopment Area 4  
 River Point District  
 City of Manitowoc



**Legend**

- Redevelopment Area 4
- River Point District
- Additional Site Features (see table)
- Bank of the Manitowoc River



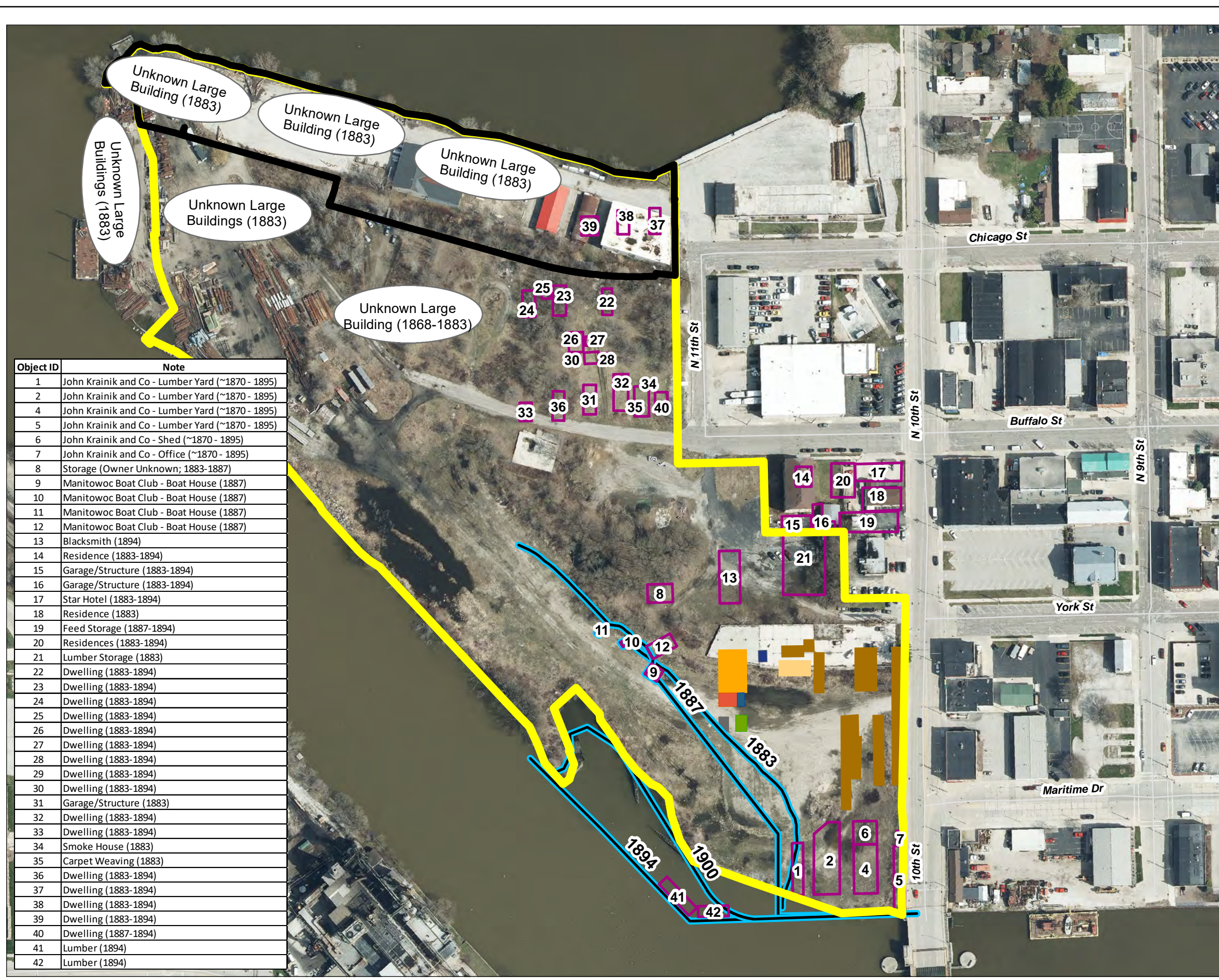
**Carl Zander Planing Mill and Factory (~1870s-1895)**

**Site Feature**

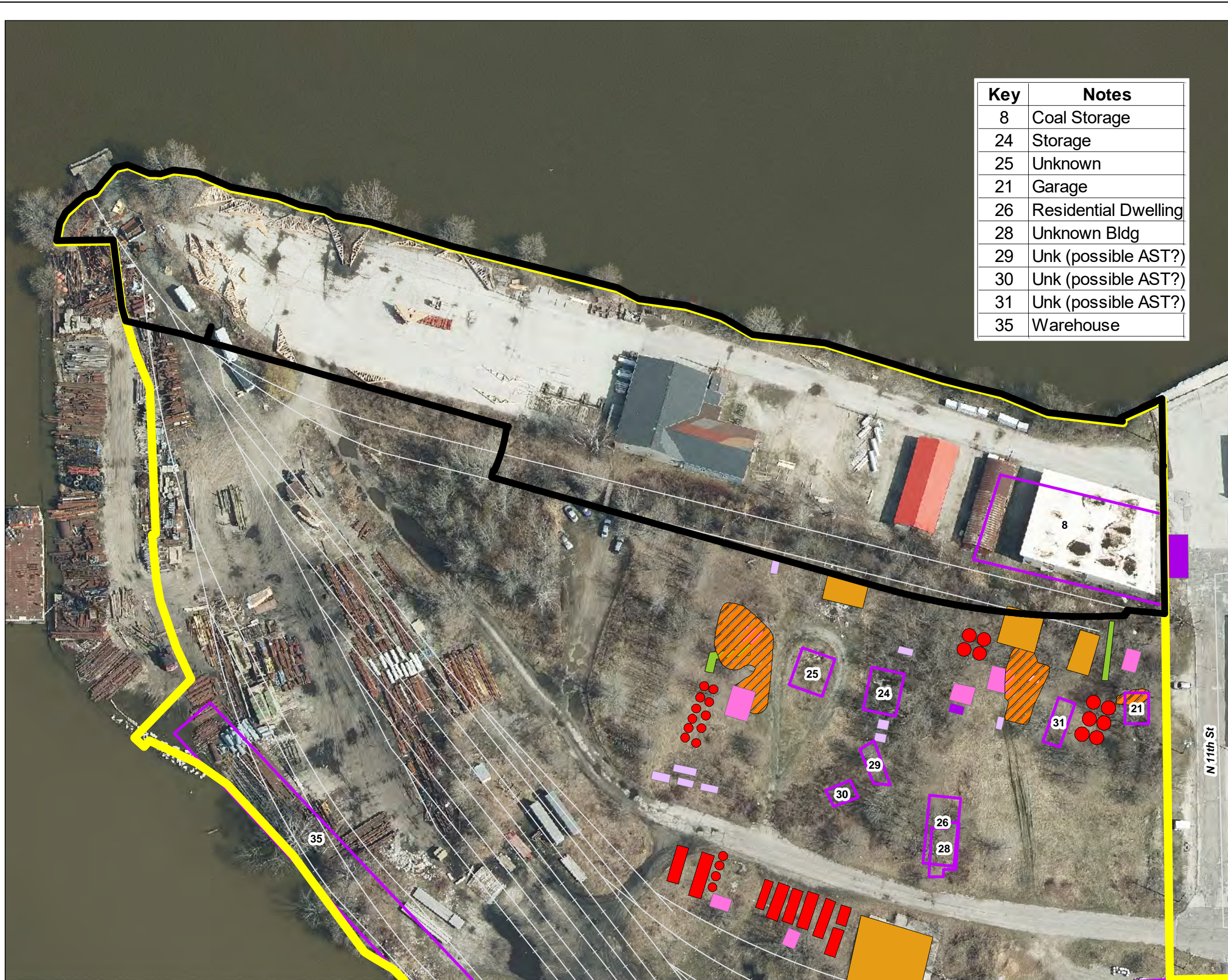
- Drying House
- Engine Room
- Lumber
- Planing Mill
- Warehouse
- Shavings
- Shed
- Steam Boxes

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Historic Site features illustrated on this figure were digitized from multiple historic maps/sources, including City Assessor files, WDNR files, and Sanborn (R) Fire Insurance Maps. These features are provided for illustration purposes only; Stantec makes no warranty as to the accuracy of these features.
3. Orthophotograph: Manitowoc County, 2020



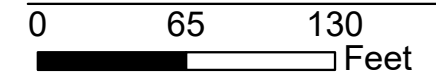
Object ID	Note
1	John Krainik and Co - Lumber Yard (~1870 - 1895)
2	John Krainik and Co - Lumber Yard (~1870 - 1895)
4	John Krainik and Co - Lumber Yard (~1870 - 1895)
5	John Krainik and Co - Lumber Yard (~1870 - 1895)
6	John Krainik and Co - Shed (~1870 - 1895)
7	John Krainik and Co - Office (~1870 - 1895)
8	Storage (Owner Unknown; 1883-1887)
9	Manitowoc Boat Club - Boat House (1887)
10	Manitowoc Boat Club - Boat House (1887)
11	Manitowoc Boat Club - Boat House (1887)
12	Manitowoc Boat Club - Boat House (1887)
13	Blacksmith (1894)
14	Residence (1883-1894)
15	Garage/Structure (1883-1894)
16	Garage/Structure (1883-1894)
17	Star Hotel (1883-1894)
18	Residence (1883)
19	Feed Storage (1887-1894)
20	Residences (1883-1894)
21	Lumber Storage (1883)
22	Dwelling (1883-1894)
23	Dwelling (1883-1894)
24	Dwelling (1883-1894)
25	Dwelling (1883-1894)
26	Dwelling (1883-1894)
27	Dwelling (1883-1894)
28	Dwelling (1883-1894)
29	Dwelling (1883-1894)
30	Dwelling (1883-1894)
31	Garage/Structure (1883)
32	Dwelling (1883-1894)
33	Dwelling (1883-1894)
34	Smoke House (1883)
35	Carpet Weaving (1883)
36	Dwelling (1883-1894)
37	Dwelling (1883-1894)
38	Dwelling (1883-1894)
39	Dwelling (1883-1894)
40	Dwelling (1887-1894)
41	Lumber (1894)
42	Lumber (1894)



Key	Notes
8	Coal Storage
24	Storage
25	Unknown
21	Garage
26	Residential Dwelling
28	Unknown Bldg
29	Unk (possible AST?)
30	Unk (possible AST?)
31	Unk (possible AST?)
35	Warehouse

Figure No.  
**4b**  
Title  
Historic Site Features (20th Century)

Client/Project  
Redevelopment Area 4  
River Point District  
City of Manitowoc



### Legend

- Redevelopment Area 4
- River Point District
- Historic Site Features (see table for details)

### Prior Site Features (City Records)

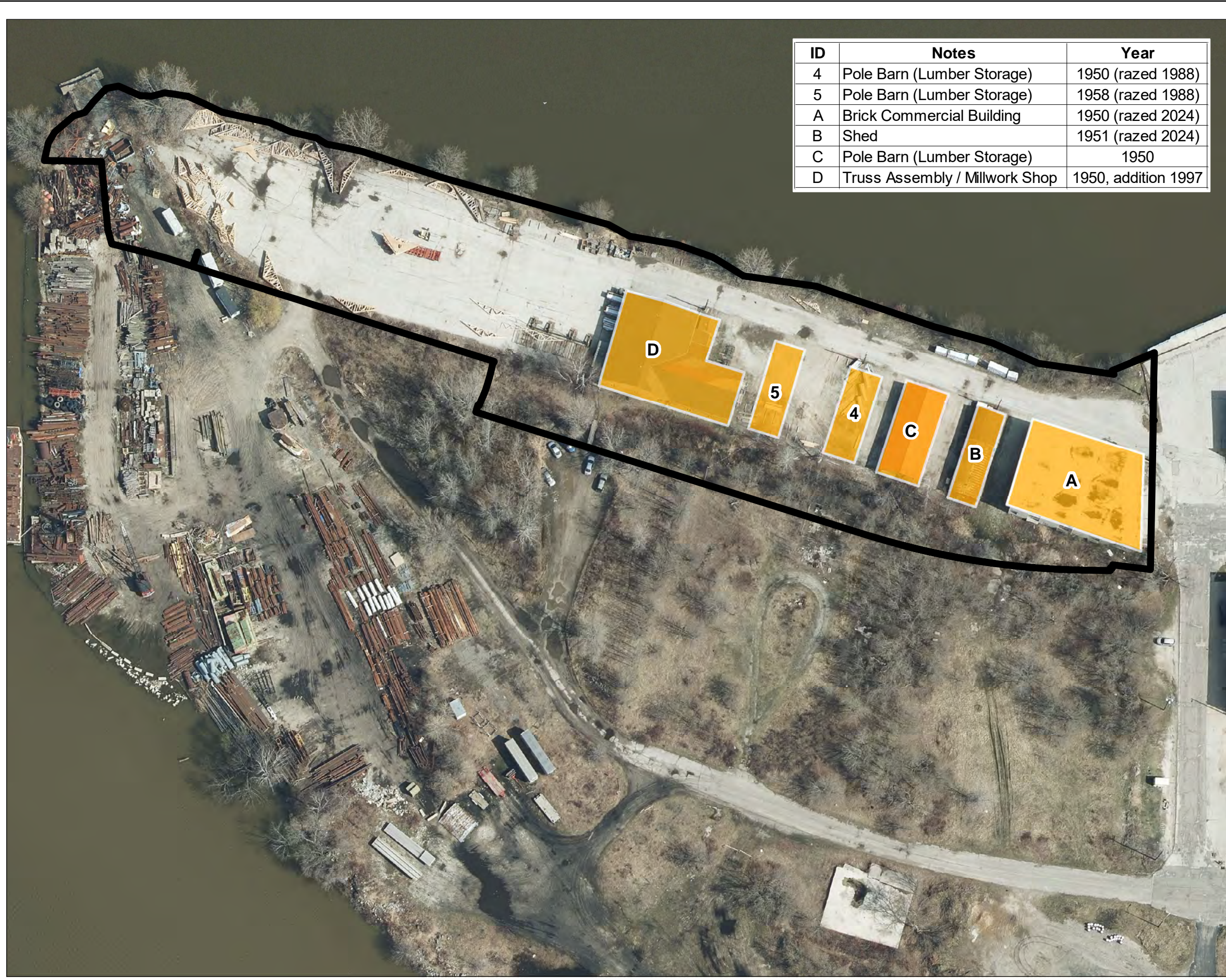
- Oil House (4)
- Oil Tank (AST) (34)
- Pump House (5)
- UST (2)

### Additional Site Features (WDNR Files)

- Former UST (10)
- Product Piping (2)
- Pump House (2)
- Soil Excavation (3)

- Notes
- Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
  - Historic Site features illustrated on this figure were digitized from multiple historic maps/sources, including City Assessor files, WDNR files, and Sanborn (R) Fire Insurance Maps. These features are provided for illustration purposes only; Stantec makes no warranty as to the accuracy of these features.
  - Orthophotograph: Manitowoc County, 2020

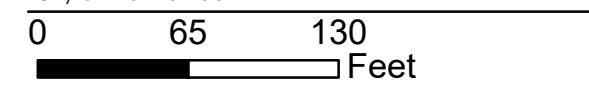




ID	Notes	Year
4	Pole Barn (Lumber Storage)	1950 (razed 1988)
5	Pole Barn (Lumber Storage)	1958 (razed 1988)
A	Brick Commercial Building	1950 (razed 2024)
B	Shed	1951 (razed 2024)
C	Pole Barn (Lumber Storage)	1950
D	Truss Assembly / Millwork Shop	1950, addition 1997

Figure No.  
**4C**  
 Title  
**Historic Site Features (21st Century)**

Client/Project  
 Redevelopment Area 4  
 River Point District  
 City of Manitowoc



**Legend**

- Redevelopment Area 4
- Buildings Targeted for Demolition (see table for description)

Notes  
 1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet  
 2. Orthophotograph: Manitowoc County, 2020  
 3. Notes on prior use and construction details as described in assessor records contained in the Stantec (2019) Phase I ESA.





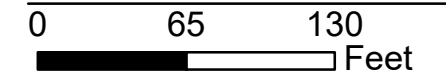
Figure No.

5



Title

Sampling Locations




Client/Project  
Redevelopment Area 4  
River Point District  
City of Manitowoc

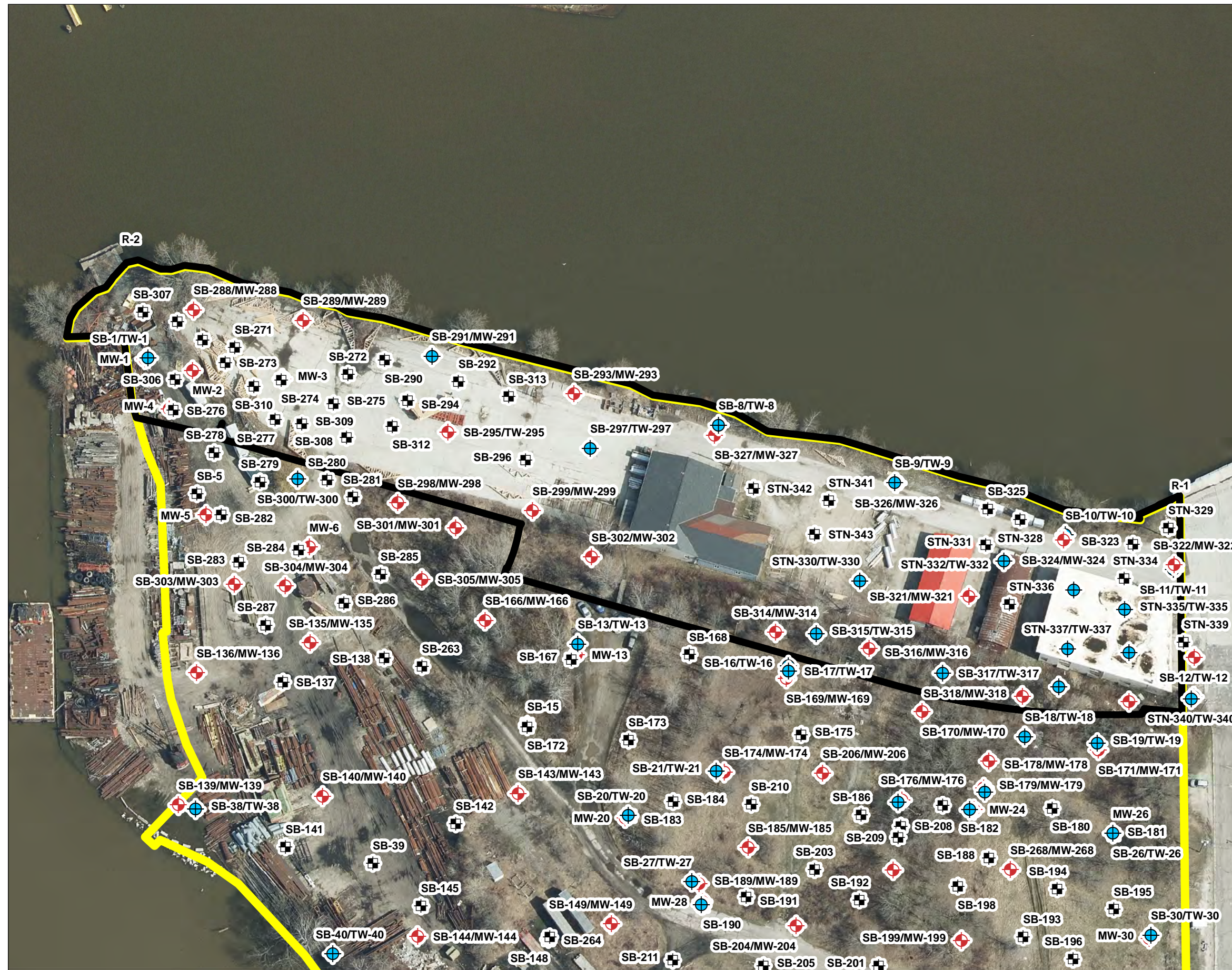


Legend

-  River Point District
-  Redevelopment Area

Sample Locations

-  Soil Boring (80)
-  Soil Boring / Monitoring Well (57)
-  Soil Boring / Temp Well (35)



NOTE:  
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet  
2. Orthophotograph: Manitowoc County, 2020



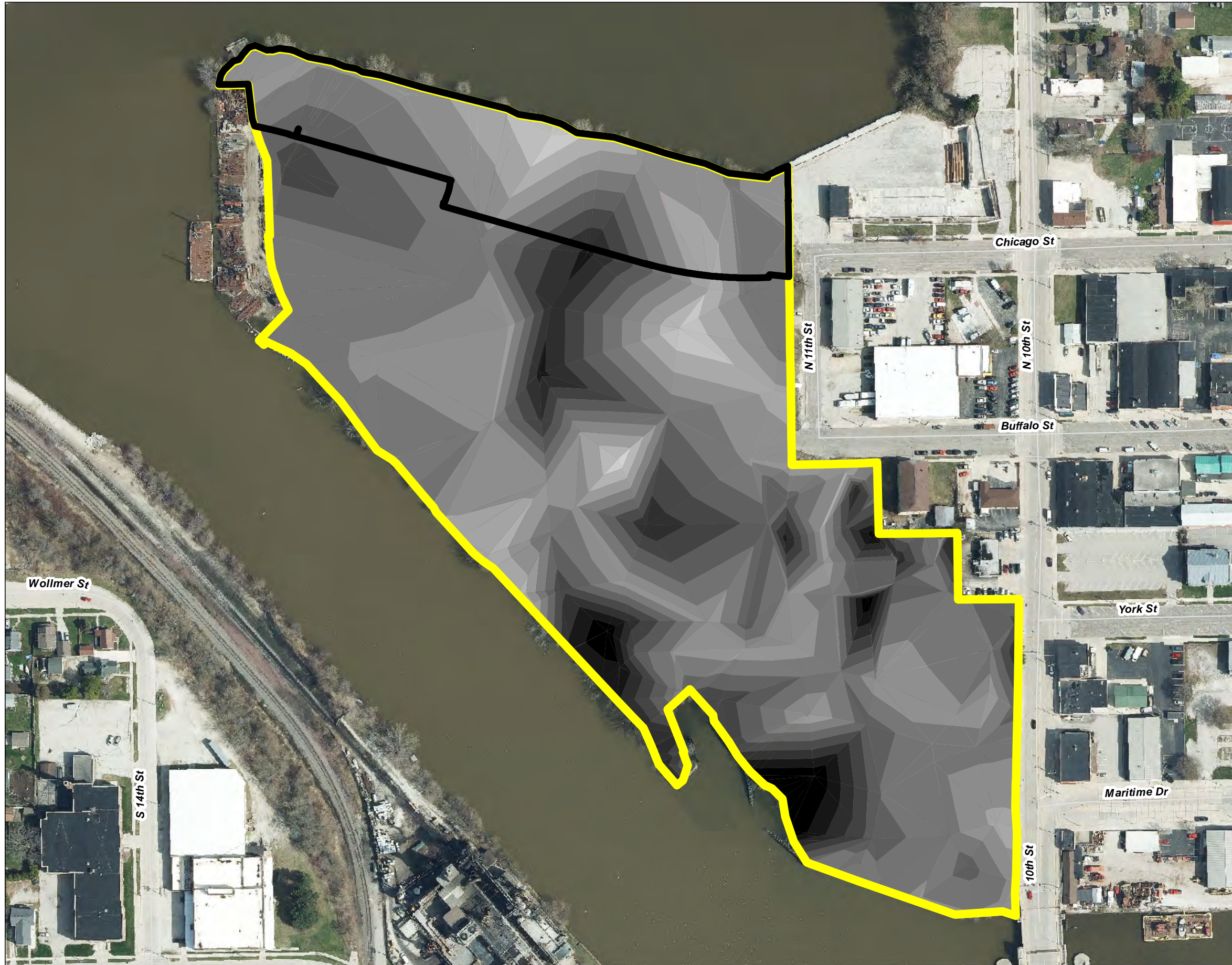
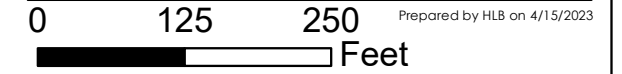


Figure No.  
**6**  
 Title  
 Historic Fill Extent and Thickness

Client/Project  
 Redevelopment Area 4  
 River Point District  
 City of Manitowoc



**Legend**

Redevelopment Area 4

River Point District

**Depth to Bottom of Fill  
 (Feet Below Ground Surface)**

- 7.111 - 8
- 6.222 - 7.111
- 5.333 - 6.222
- 4.444 - 5.333
- 3.556 - 4.444
- 2.667 - 3.556
- 1.778 - 2.667
- 0.889 - 1.778
- 0 - 0.889

Notes  
 1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet  
 2. Orthophotograph: Manitowoc County, 2020





Figure No.  
7

Title  
Redevelopment Area 4 and  
Soil Impacts

Client/Project  
Redevelopment Area 4  
River Point District  
City of Manitowoc

0 65 130  
Feet

**Legend**

- River Point District
  - Redevelopment Area
- Sample Locations
- Soil Boring (80)
  - Soil Boring / Monitoring Well (57)
  - Soil Boring / Temp Well (35)
- Soil Impacts
- Petroleum PAH > IDC RCL
  - Petroleum PAH > NIDC RCL
  - PVOC > NIDC RCL
  - PVOC > Soil to GW RCL
  - CVOCs > Soil to GW RCL
  - PVOC > IDC
  - Amenable Cyanide > Soil to GW RCL



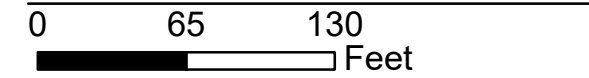
NOTE:  
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet  
2. Orthophotograph: Manitowoc County, 2020









Figure No.  
**8**  
 Title  
**Potentiometric Surface  
 of Shallow Groundwater**

Client/Project  
 Redevelopment Area 4  
 River Point District  
 City of Manitowoc



**Legend**

-  River Point District
-  Redevelopment Area 4
-  Groundwater Elevation (feet above mean sea level)



NOTE:  
 1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet  
 2. Orthophotograph: Manitowoc County, 2020



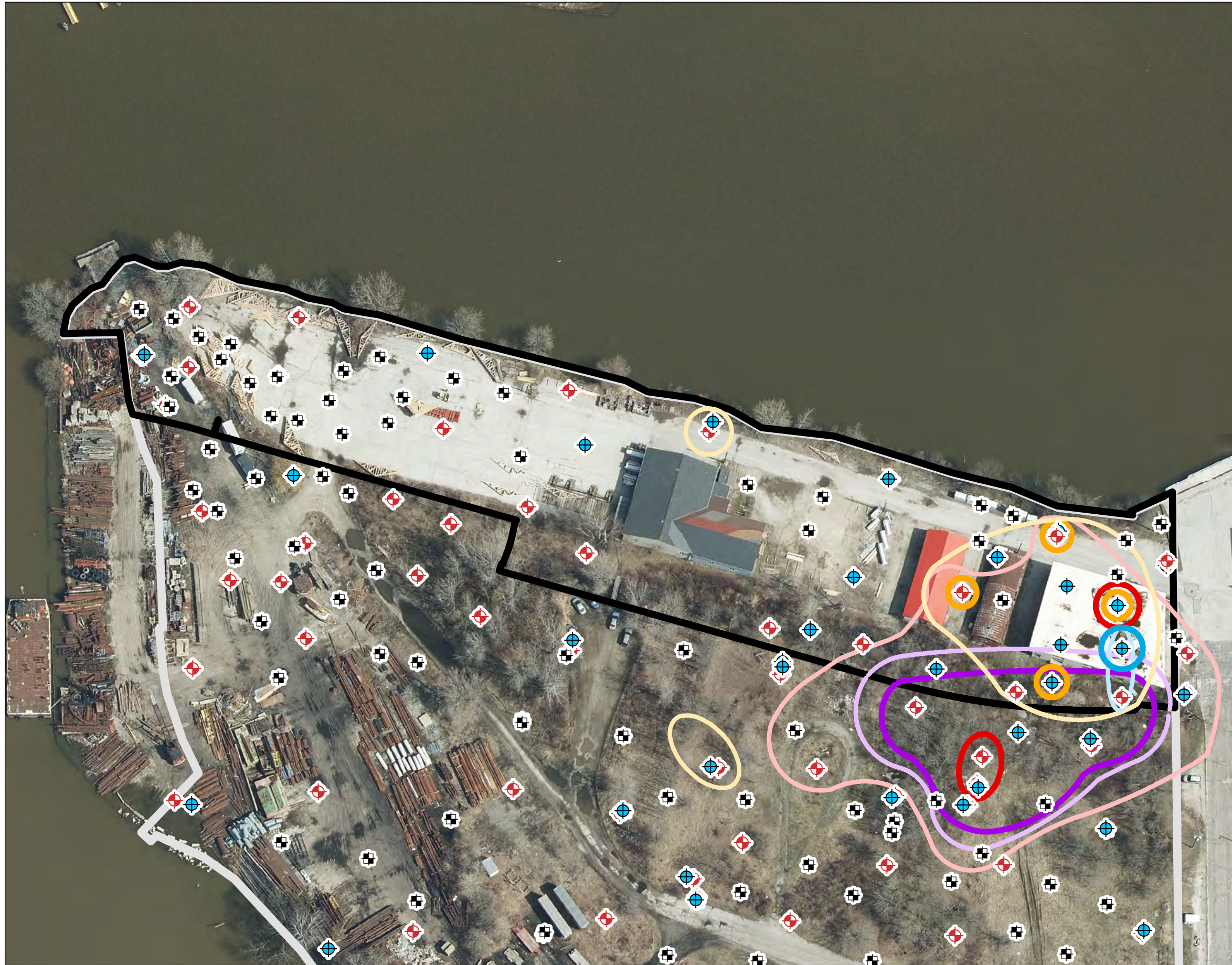
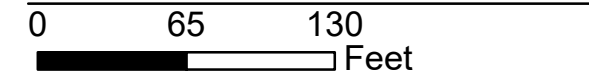


Figure No.  
**9**  
 Title  
**Redevelopment Area 4 and  
 Groundwater Impacts**

Client/Project  
 Redevelopment Area 4  
 River Point District  
 City of Manitowoc



**Legend**

- River Point District
- Redevelopment Area

- Sample Locations
- Soil Boring (80)
  - Soil Boring / Monitoring Well (57)
  - Soil Boring / Temp Well (35)

- Groundwater Impacts
- CN > ES
  - CN > PAL
  - CVOC > ES
  - CVOC > PAL
  - PAH > ES
  - PAH > PAL
  - PVOC > ES
  - PVOC > PAL



NOTE:  
 1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet  
 2. Orthophotograph: Manitowoc County, 2020  
 3. CN = cyanide; CVOC = chlorinated volatile organic compounds; PAH = polycyclic aromatic hydrocarbon; PVOC = petroleum VOC; ES = enforcement standard; PAL = preventive action limit.





Figure No.  
**10**  
 Title  
**Proposed Development Plans**

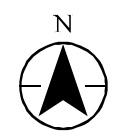
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Client/Project  
 Redevelopment Area 4  
 River Point District  
 City of Manitowoc

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0 62.5 125 Feet Prepared by HLB on 4/15/2024

- Legend**
- Redevelopment Area
  - River Point District
  - FY23 Brownfield Cleanup Grant
- Proposed Redevelopments**
- Sheetwall
  - Driveway
  - Rock Revetment
  - Buildings (Designed by Others)
  - Town Homes (2025-2026)
  - Roadway (2021-2026)
  - Landscaping (2023-2026)
  - Sidewalk (2025-2026)
  - River Walk / Park (2023-2026)
  - Proposed Commercial (2025-2026)

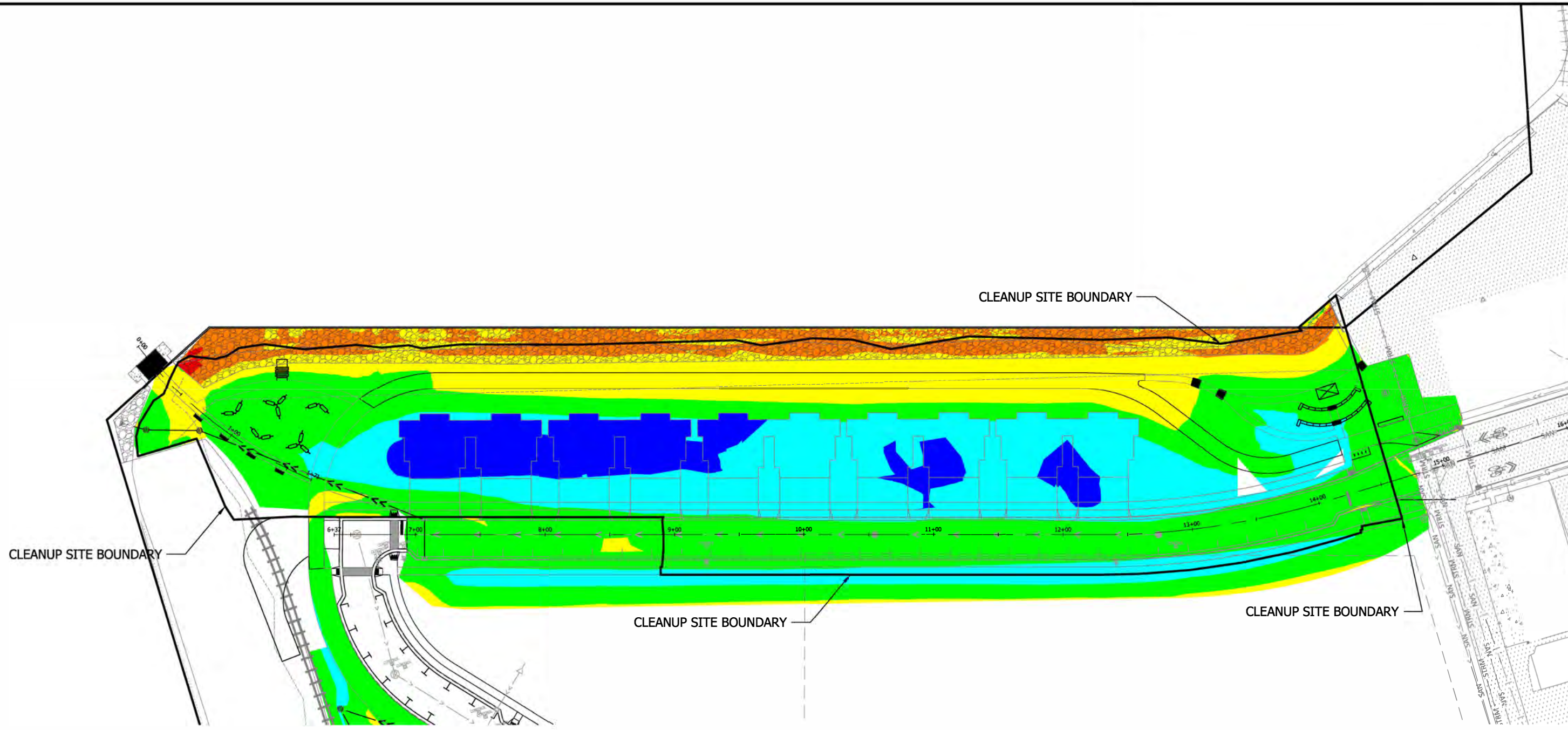


Notes  
 1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet  
 2. Orthophotograph: Manitowoc County, 2020

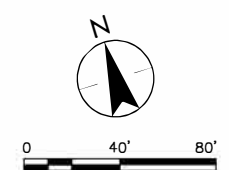


THE CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS. DO NOT SCALE THE DRAWING - ANY ERRORS OR OMISSIONS SHALL BE REPORTED TO STANTEC WITHOUT DELAY. REPRODUCTION OF THIS DRAWING FOR ANY PURPOSE OTHER THAN THAT AUTHORIZED BY STANTEC IS FORBIDDEN.

Plot Date: 10/04/2024 - 1:20pm  
 Drawing Name: C:\Users\lmarling\OneDrive\Stantec Consulting\193030042\River\_Point\Project Files\193030042\River\_Point\CAD\Phase4\1\_Sheet\Phase4\_Surface\_Cut\_Fill\_Map.dwg  
 Xref(s): Border, 193030042\_Site\_Phase4, 193030042\_Site\_Phase4, 193030042\_Site\_Phase4, 193030042\_Site\_Phase4, 193030042\_Site\_Phase4



SURFACE ELEVATION DATA			
NUMBER	MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOR
1	-20.00	-15.00	Red
2	-15.00	-10.00	Orange
3	-10.00	-5.00	Yellow
4	-5.00	0.00	Light Green
5	0.00	5.00	Green
6	5.00	10.00	Cyan
7	10.00	15.00	Blue



**CUT-FILL HEAT MAP**  
 RIVER POINT - PHASE 4  
 CITY OF MANITOWOC  
 MANITOWOC, WISCONSIN

DATE OF ISSUANCE	09/20/2024
NO. REVISION	DATE
1	30% SET 09/20/2024
SURVEY	CORNER POINT
DRAWN	KRM
DESIGNED	KRM
CHECKED	JAW
APPROVED	JAW
PROJ. NO.	193030042
SHEET NUMBER	Figure 11

**TABLE**





Table 1  
 Analysis of Brownfields Cleanup Alternatives  
 Phase 4 Redevelopment Area, River Point District  
 Manitowoc, Wisconsin

<b>Remedial Action Area Description:</b>		The target remedial area consists of vacant land formerly initially developed as a transloading facility in the 19th Century (lumber and coal) followed by redevelopment in the 20th Century for railroad use, which included former bulk petroleum storage in the surrounding area. Residual volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), Resource Conservation and Recovery Act (RCRA) metals and amenable cyanide are present in soil/fill across the Site at concentrations greater than health-based ch. NR 720 WAC non-industrial direct contact and/or ch. NR 720 WAC soil to groundwater residual contaminant levels (RCLs). In addition, VOCs, PAHs, and amenable cyanide impacts to groundwater remain at concentrations that exceed ch. NR 140 WAC groundwater enforcement standards (ESs) and/or preventive action limits (PALs).											
<b>Exposure Routes of Concern (Check Boxes As Applicable):</b>		<b>Soil</b>				<b>Groundwater</b>		<b>Sub-Slab Vapor</b>		<b>Building Materials</b>			
		Direct Contact	Yes	Soil to Groundwater	Yes	Consumption	Yes	Vapor Intrusion	Possibly; VOCs detected in soil/groundwater	Lead Paint	No	Asbestos	No
<b>Media</b>	<b>Remedial Alternative</b>	<b>Remedial Action Options Evaluation</b>											
		<b>Technical Feasibility - ch. NR 722.07(4)(a)</b>					<b>Economic Feasibility ch. NR 722.07(4)(b)</b>			<b>Sustainability ch. NR 722.09(2m)</b>			
		<i>Long-Term Effectiveness</i>	<i>Short Term Effectiveness</i>	<i>Implementability</i>	<i>Restoration Time Frame</i>								
<b>Soil and Groundwater</b>	Alt 1 - Natural Attenuation	Natural attenuation of residual petroleum and solvent impacts to soil and groundwater is possible. However, heavy metal impacts in soil are considered recalcitrant to natural attenuation. Therefore natural attenuation would not reduce the overall heavy metal toxicity, mobility, and volume of impacts. Natural attenuation would not be protective of public health, safety, or welfare or the environment in the short-term or long-term time periods.		Implementation of Alt 1 is technically feasible; however, monitoring the effectiveness of the remedial action is impractical. Redevelopment potential would be impeded.	As heavy metal constituents associated with residual impacts are considered recalcitrant, the overall magnitude, mobility, and toxicity of impacts would not decrease and Site restoration will not occur within a reasonable timeframe.	Initial and capital costs to implement Alt 1 are minimal; however, future potential costs associated with monitoring natural attenuation could be significant as constituents are recalcitrant to natural attenuation.			The carbon footprint and energy use associated with Alt 1 is considered minimal. However, Alt 1 is not considered to be protective of health/safety/env. within a reasonable timeframe.				
	Alt 2 - Excavate all impacted soils and transport offsite for disposal at a licensed solid waste landfill; backfill with clean fill materials to final grade; stabilize/replace sheet pile wall instability caused by excavation; and establish an institutional control to manage residual groundwater impacts.	Excavation of impacted soil/fill will provide for immediate and permanent reduction in the toxicity, mobility, and volume of contaminants and would protect public health, safety, welfare and the environment in a short-term time frame. An institutional control is considered effective for prevention of groundwater consumption while residual impacts naturally degrade.		Alt 2 is technically feasible and technology is available for implementation. Waste disposal approval will be needed from the landfill.	The Site would be restored within 3 months pending availability of a suitable quantity of fill. Institutional controls will be needed to provide for long-term control of residual impacts.	Source removal capital includes excavation and offsite disposal of a considerable volume of fill (14,400 cubic yards [CY] @ \$120 per CY = \$1,728,000) and backfilling the excavation to current grade with imported fill (14,400 CY @ \$30 per yard = \$432,000). Based on the contamination extent, the effectiveness of the already deteriorating sheet pile would likely be adversely impacted during excavation and would require repair/replacement. Repairing/replacing the wall is estimated to cost up to approximately \$5,525,000 (42,500 square feet [sq ft] x \$130 per sq ft). Additional costs include clearing (\$114,000) and mobilization and stormwater management (\$261,363). Engineering/consulting costs (design, cleanup oversight, reporting, establishing institutional controls, closure request) is estimated to be \$800,000.			Extraordinary energy and fuel use will be incurred with offsite disposal of building materials and backfilling the excavation; however low sulfur diesel can be used and a no-idle policy will reduce the carbon footprint. Alt. 2 will maximize energy use and soil disturbance. Alternative 2 allows for maximum reuse of the Site.				
	Alt 3 - Limited excavation and offsite disposal of impacted fill; constructing engineered barriers to minimize direct contact with impacted soil/fill and reduce potential for leaching of residual impacts to groundwater; and establishing institutional controls/continuing obligations and maintenance plans to provide for long-term control of residual soil and groundwater impacts (future)	Excavation and removal of soil with elevated impacts is effective in both the short and long-term time frames. Construction of a sitewide engineered barrier would provide for short-term protection of public health, safety, welfare and the environment. However, long-term effectiveness will depend on maintenance of the engineered barrier. The SSDs can be activated to mitigate vapor intrusion potential and be protective of public health if post-construction vapor sampling results indicate vapor intrusion is a potential concern following construction. Residual groundwater impacts will be effectively managed by an institutional control.		Alt 3 is technically feasible and technology is available for implementation.	The Site would be restored concurrent with redevelopment. Institutional controls will be needed to provide for long-term control of residual impacts.	The Site will be cleared (\$113,626) and 8,445 CY of impacted fill material will be excavated and transported offsite for disposal at a licensed solid waste landfill as source control related to slope stabilization, building foundation construction, Chicago Street ROW installation, and site grading (8,445 CY x \$120 per CY = \$1,013,400). Installing a sheet pile wall along the eastern boundary to stabilize the development in the local area following excavation is estimated to cost \$94,640. Portions of the property where the granular material is managed in place will be finished with: hardscape engineered barriers (stone/concrete/asphalt/rip rap; \$741,506) or landscaped/permeable engineered barriers (importing and placing clean soil finished in vegetation; \$567,472). Other construction costs include mobilization and stormwater management (\$261,363). Engineering/consulting costs (cleanup oversight, reporting, establishing institutional controls, closure request) is estimated to be \$310,000.			Fill may be available at no cost to the City pending future City project schedules, and pending approval the fill could be used to construct a portion of the engineered barriers proposed along the river front. Petroleum-impacted soil may be placed on the biopile at the solid waste landfill and later reused by the landfill. Energy and fuel use would be minimized; however, local infrastructure (roads) could be impacted during importation of soil; however low sulfur diesel can be used and a no-idle policy will reduce the carbon footprint.				



**TABLE 2 - Cleanup Budget Estimate**  
**MANITOWOC - RIVER POINT DEVELOPMENT - P H A S E 4**

ITEM #	APPLICABLE PAY ITEMS	UNITS	QUANTITY	UNIT COST	Cost
<b>GENERAL</b>					
1	Mobilization	LS	1	\$ 200,000.00	\$ 200,000.00
2	Construction Staking (Entire Project)	LS	1	\$ 25,000.00	\$ 25,000.00
3	Traffic Control	LS	1	\$ 20,000.00	\$ 20,000.00
6	Silt Fence	LF	913	\$ 2.25	\$ 2,054.25
7	Erosion Mat	SY	3,577	\$ 4.00	\$ 14,308.00
<b>GENERAL SUBTOTAL</b>					<b>\$ 261,362.25</b>
<b>CLEANUP - EXCAVATION AND OFFSITE DISPOSAL OF IMPACTED SOIL</b>					
12	Clearing & Grubbing	LS	1	\$ 10,000.00	\$ 10,000.00
13	Remove Gravel	SY	1,500	\$ 3.85	\$ 5,775.00
14	Remove Concrete	SY	7,527	\$ 13.00	\$ 97,851.00
20	Sheet Pile Wall	SF	728	\$ 130.00	\$ 94,640.00
18	Excavation, Transport, and Disposal of Soil at Landfill	CY	8,445	\$ 120.00	\$ 1,013,400.00
<b>CLEANUP - EXCAVATION AND OFFSITE DISPOSAL OF IMPACTED SOIL SUBTOTAL</b>					<b>\$ 1,221,666.00</b>
<b>CLEANUP - ENGINEERED BARRIERS (HARDSCAPE CAPS)</b>					
19	Stone Blocks	EA	22	\$ 1,750.00	\$ 38,500.00
8	Heavy Duty Rip Rap	TON	2,200	\$ 75.00	\$ 165,000.00
25	8" Concrete Pavement	SY	2,670	\$ 59.95	\$ 160,066.50
26	6" of Gravel Base	CY	445	\$ 35.00	\$ 15,575.00
27	12" Stabilization layer	CY	890	\$ 35.00	\$ 31,150.00
28	HMA Pavement Upper Lift Type 5LT 58-28 S	TON	84	\$ 353.50	\$ 29,694.00
29	HMA Pavement Lower Lift Type 5LT 58-28 S	TON	84	\$ 353.50	\$ 29,694.00
30	Tack Coat	Gal	149	\$ 3.89	\$ 579.61
31	CABC, 3'4" for Asphalt and Aggregate Trail	CY	240	\$ 61.50	\$ 14,760.00
33	6" Concrete Sidewalk	SF	9,945	\$ 8.45	\$ 84,035.25
34	CABC, 3/4" Base for Sidewalk	CY	184	\$ 61.50	\$ 11,326.25
39	Ramps with truncated domes	EA	3	\$ 375.00	\$ 1,125.00
50	Amphitheater Steps	LS	1	\$ 160,000.00	\$ 160,000.00
<b>CLEANUP - ENGINEERED BARRIERS (HARDSCAPE CAPS) SUBTOTAL</b>					<b>\$ 741,505.61</b>
<b>CLEANUP - ENGINEERED BARRIERS (LANDSCAPE CAPS)</b>					
15	Topsoil (12")	CY	3,302	\$ 25.00	\$ 82,558.33
16	Importing and Compacting General Fill	CY	12,199	\$ 30.00	\$ 365,975.74
22	Bioretention Area - Engineering Media	CY	246	\$ 80.00	\$ 19,680.00
23	Bioretention Area - Pea Gravel	CY	30	\$ 90.00	\$ 2,700.00
24	Bioretention Area - Mulch	CY	12	\$ 80.00	\$ 960.00
32	Biaxial Geogrid	SY	2,670	\$ 2.50	\$ 6,675.00
44	No Mow Fescue	SY	3,603	\$ 12.00	\$ 43,236.00
45	Shoreline Restoration Seeding	SY	1,119	\$ 5.00	\$ 5,595.00
47	Shoreline Restoration Plugs	EA	2,822	\$ 12.50	\$ 35,275.00
48	Biofiltration Plugs	EA	247	\$ 12.00	\$ 2,964.00
49	Temporary Seed Mix	SY	4,631	\$ 0.40	\$ 1,852.40
<b>CLEANUP - ENGINEERED BARRIERS (LANDSCAPE CAPS) SUBTOTAL</b>					<b>\$ 567,471.47</b>
<b>CLEANUP TOTAL</b>					<b>\$ 2,792,005.33</b>



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Stantec is a global leader in sustainable architecture, engineering, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

