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## 6.1 Market Overview

### 6.1.1 Demographics

The City of Milwaukee, as well as the metropolitan area, represents a large and growing market. The City's population of approximately 630,000 ranks as the nation's 17th largest city. Milwaukee County's population is nearly 1.0 million, while the four-county metropolitan area exceeds 1.4 million, making Greater Milwaukee the 32nd largest metropolitan statistical area. Metropolitan growth has averaged 2.5% annually since 1980. (See Table 6.1.1 for demographics of metro area.)

### 6.1.2 Cost of Living

Milwaukee's cost of living is approximately 3% above the United States' average. This compares to costs of living which are 10% - 52% above average in major northeastern United States cities; and 15% - 31% above average in southern California.

Milwaukee is ranked as one of the most affordable housing markets of the nation's largest cities according to an industry survey released by the National Association of Home Builders in 1992.

The median sale price of an existing single family home in metro Milwaukee was \$96,100 in 1992, compared to Chicago at \$131,000; New York at \$169,300; and Seattle at \$141,300.

Projections by WEFA indicate that home values will outpace inflation by 3.42% over the next three years.

#### Downtown Housing

While a large amount of housing is currently being developed in Downtown Milwaukee, even more is under consideration. The following list projects approximately 800 new downtown housing units in addition to the proposed development at Beer Line "B."

#### Downtown-area Housing Currently Under Development in Milwaukee

- **Brewer's Point Apartments** (This project is part of the Beer Line "B" project area.)

This project is an adaptive reuse of the long-abandoned Gimbel's warehouse on Commerce Street

	Downtown	10-Mile Radius	Four-County Metro Area
1990 Census	7,188	923,370	1,432,149
1995	7,200	925,000	1,485,094
2000	7,790	927,000	1,542,500
<b>Demographics - Sex</b>			
Male	4,086	436,565	689,423
Female	3,102	486,805	742,725
<b>Demographics - Age</b>			
Less than 5	32	72,874	109,137
5 to 17	58	64,177	267,003
18 to 24	2,734	100,715	144,847
25 to 44	2,706	299,925	469,246
45 to 64	985	158,370	263,401
65 and over	673	127,309	178,515
<b>Total Households</b>			
One-person	3,713	360,681	537,722
Family	2,341	107,300	137,178
Households w/children	522	229,665	369,799
Single parent w/children	58	117,244	179,714
Average	26	45,884	49,672
	1.24	2.49	2.60
Median Income (1989)	\$26,067	\$28,855	\$32,316

Table 6.1.1 • Population and Demographic Data  
Source: US Census, 1990; Southeastern Wisconsin Regional Planning Commission

across the Milwaukee River from Downtown. Brewer's Point Apartments will have 47 two-bedroom units, 40 one-bedroom units, and 20 studio apartments. Eighty-two parking spaces will be created within the building, with 76 on-site spots also available. Rents are expected to range from \$550 to \$1,150.

Developer and owner Mike Carnahan received a \$3.8 million first mortgage from Equitable Bank for the project, and the Milwaukee Economic Development Corporation provided a \$1.2 million second mortgage.

- **Cawker Building Condominiums** Development partners Dick Leep and John Raettig are following their success at creating housing in the former Gallun Tannery offices by renovating the historic Cawker Building in the center of Downtown, at 108 West Wells Street, into about 20 riverfront condos. The condos will be developed in the vacant upper four floors of the office building, which was built in 1897 on the Milwaukee River at the northeast corner of West Wells Street and North Plankinton Avenue.

Most of the condos have been sold, and construction is underway. Prices of the units range from \$62,000 to

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\$143,000. The typical condo has two bedrooms and 1,200 square feet. No city funding is involved, although sections of the \$11 million Riverwalk system are on adjacent blocks and a new Riverwalk segment is being planned for this block. The first units are expected to be occupied in late summer of 1997. The building, which was constructed in 1897, lies across the river from the theater district and across the street from Rock Bottom Brewery.

- **City Hall Square Apartments** Groundbreaking took place recently on this \$28 million mixed-use renovation project encompassing almost an entire city block on the Milwaukee River across the street from Milwaukee's spectacular, 100-year old City Hall. The project's \$16 million first phase will create about 140 one- and two-bedroom apartments, with about 30 units to be built in the second phase. The development will include 80,000 square feet of commercial space.

The project consists of nine largely vacant historic buildings constructed mainly from the mid 1800's to the early 1900's in what was the heart of the downtown retail district in the mid-nineteenth century. The development is one of the largest historic preservation efforts in Milwaukee history.

About 100 of the units will be at market rate, with rents ranging from about \$775 to \$1,100. The remaining units will have monthly rents for qualifying people of \$490 to \$585. (The lower rents will be in effect for 15 years because of a federal tax credit program used for this project.) The City is providing infrastructure and a \$5.15 million loan for the project. Occupancy is scheduled to begin in early 1998, with the project slated for completion in late 1998.

- **Lake Bluff at East Pointe** The next phase of the successful East Pointe residential development, on the north edge of Downtown, will be the \$15 million Lake Bluff at East Pointe, a four-story, 109-unit luxury apartment building on the 1300 block of North Prospect Avenue overlooking Lake Michigan. Monthly rents are estimated at \$800 to \$2,000. Units will have fireplaces and high ceilings, underground parking and views of Lake Michigan from the bluff. The City recently approved a \$1.5 million second mortgage loan as part of the project. The City will also provide public infrastructure, site improvements

and a new pedestrian connection to the lakefront. Construction started during the summer of 1997, with occupancy slated for fall 1998.

- **Library Hill Apartments** Construction has begun for the \$10.5 million Library Hill Apartments, which will be built on the block east of Milwaukee's historic Central Library. Library Hill will consist of a new, four-story, courtyard-style building with 110 one-, two-, and three-bedroom apartments. The City is providing the land and covering the costs of acquisition, demolition, and relocation, which may total an additional \$5 million. Completion is expected in early 1999.
- **Milwaukee Street Apartments** The owners of two adjoining historic 1800's commercial buildings at 715 and 723 Milwaukee Street, just north of Wisconsin Avenue, are renovating the third and second floors into a total of 10 one- and two-bedroom apartments. Rents are expected to range from \$770 to \$1,000 per month. The City has approved a \$350,000 second mortgage loan as part of the \$850,000 project, which includes renovation of the ground floor retail space. Construction is underway, with completion by late fall.
- **Riverfront Lofts Condominiums** Tandem Realty Corporation of Chicago is turning the 10-story former Nelson Brothers furniture warehouse on North Plankinton into 48 luxury condominiums. Located on the Riverwalk in the center of Downtown, Riverfront Lofts will soon be offering condos priced from \$107,000 to \$297,000. Construction could start this fall, with new residents moved in as early as January. The building will include new individual balconies. The partially vacant building currently contains 12 apartments, which will be among the new condos. The building was constructed for commercial use in 1915 and designed by Armand Koch, son of Henry C. Koch, architect of City Hall and the Pfister Hotel.
- **Riverwalk Plaza Condominiums** Plans for the \$9.5 million renovation of two historic and largely vacant buildings on the Milwaukee River into 79 condominiums have moved ahead of schedule. All units are reserved. The loft-style condos will include a riverwalk, boat slips, and new balconies. The condos will sell for \$65,000 to \$170,000. The five- and six-story buildings, constructed in 1889 and 1894, were used for shoe manufacturing and grocery

warehousing. The project is privately financed and developed, although the City will help provide riverwalks for the two buildings.

- **The Ware House Apartments** Forty-three loft-style apartments are being developed in the \$4.1 million renovation of the 104-year old former Shadboldt and Boyd building, originally constructed for a wholesaler of iron and steel, carriage hardware and wagon woodwork. Construction is underway. The six-story building will include 33 underground parking spaces and 42 surface spots, with rents ranging from \$795 to \$1,895 a month. Likely tenants include professionals from nearby Wisconsin Electric and Blue Cross corporate offices.
- **City Hall Square, Phase II** The second phase of City Hall Square, which is slated to be completed next year, will consist of 30 apartments renovated from historic buildings on Water Street.
- **Westown Area** The tax incremental district developed for the Library Hill Apartments could support an additional 200 housing units in the area, especially on the block between North 6th and North 7th Streets and across from the library.
- **Other projects** Smaller projects of 10 to 30 units each could take place on Milwaukee Street, in the Third Ward and on Plankinton. Other Class B office buildings downtown are candidates for residential conversions. Also, the East Pointe project has three additional phases on the drawing boards.

**Other Downtown-area Housing Projects**

- **East Pointe Commons** 188 rental units with both apartments and townhome units. The size of the units range from 790 square foot one-bedroom units to 1,825 square foot three-bedroom units.
- **Yankee Hill** Yankee Hill is a ten-year old housing project with a combination of townhomes and highrise apartments. The project includes 350 units consisting of one-bedroom units ranging in size from 675 - 775 square feet, and two-bedroom apartments ranging in size from 1,015 - 1,200 square feet. The rents range from \$715 - \$1,240 per month.
- **The Blatz** This is a renovated brewery complex with 169 one- and two-bedroom units ranging in size from

680 square feet to 1,450 square feet with rents ranging from \$800 to \$1,600.

**6.1.3 Market Demand**

A comprehensive market analysis was not part of the scope of this project. The counsel of local developers and commercial real estate was sought out to inform our process. The input of Barry Mandel and Richard Lincoln of the Mandel Group, and Jeff Siegel of Siegel-Gallagher, Inc. was particularly valuable.

**Housing**

There is not a prevailing “pent-up” market for the Beer Line “B” development. The market for this project is segmented. The housing developed on the site must respond with a variety of housing types to appeal to a variety of market segments. It is anticipated that the predominant market will be a young population, dual income no kids, and single, young professionals. There is a demand for high quality, affordable housing (not subsidized).

There is a demand for both condominium- and rental development. There is the potential to tap into “walk to work” programs for corporations in the immediate vicinity of the site. Between 2,000 and 3,000 people work at Schlitz Park with Blue Cross/Blue Shield, Warner Cable, and Humana Health Care being the largest employers. It is very important that the unit types respond to the market place. For example, a very successful unit type at East Pointe Commons was the two-bedroom, two bath units that has been popular with the young professional market segment.

The boat docks have also been very successful amenities as a selling feature of the housing. Much of the floating “dockominiums” are delivered in a “turnkey” operation at no expense to the developer. Security features must be part of the design of the private docks.

It is anticipated that the rental units will yield \$.90/square foot/month. (\$900 for a 1,000 square foot unit) The cost of construction will range between \$80 - \$100/per square foot.

**Retail**

The service retail for this area is well served by East Point, Brady Street, Martin Luther King Drive, and the potential Jewel/Osco development at the Humboldt Yards at the east end of the site.

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The type of retail that could work well along the Beer Line "B", particularly along the Riverwalk, is "destination-type retail" like the Lakefront Brewery. A quality restaurant could likely do well on the site. It is unlikely that the site could support more service retail.

### Commercial

There is not a great demand for office space at the present time. The type of development that could work on the site is "build to suit" type development that is constructed to maximize the value of the location on the river. It is anticipated that the floor plates in any development will be small – 4,000 to 5,000 square feet. The majority of commercial and retail activity has been programmed for the west end of the site along Pleasant Street. A second area is located around the base of the Holton Street Bridge. This site includes the ground floor of the Carnahan development, the Forestry Building, and the area immediately to the east of the Holton Street Bridge. A third area is located at the east end of the site adjacent to Humboldt Avenue.

## 6.2 Preliminary Environmental Evaluation

### 6.2.1 Process

A preliminary environmental evaluation was completed for this project to assess the environmental conditions of the Beer Line "B", how the environmental conditions of the project site may affect redevelopment opportunities of specific parcels and how the conceptual plans for Beer Line "B" could be integrated with existing environmental challenges to minimize redevelopment costs. The preliminary environmental evaluation consisted of a review of available information for Beer Line "B" and a limited Phase II Investigation. The results of the preliminary environmental evaluation are presented in this section.

The evaluation was initiated by reviewing existing information for the project site. The following informational sources were reviewed.

- "Phase I Environmental Assessment of the Beer Line "B" Project Site" prepared by the City of Milwaukee, dated May 28, 1997
- "Site Investigation and Remedial Action Plan, Forestry Headquarters, 1872 North Commerce Street, Milwaukee, Wisconsin" prepared by Giles Engineering Associates, Inc. and dated March 31, 1997
- "Petroleum-Impacted Soil Removal Monitoring Services Associated with the Former Gasoline UST, Forestry Headquarters, 1872 North Commerce Street, Milwaukee, Wisconsin" prepared by Giles Engineering Associates, Inc. and dated April 10, 1997
- "Site Investigation, Remedial Action Plan and Petroleum Impacted Soil Removal Services (Former Fuel Oil UST), Forestry Headquarters, 1872 North Commerce Street, Milwaukee, Wisconsin" prepared by Giles Engineering Associates, Inc. and dated April 10, 1997
- "Environmental Site Assessment, Former Trostel Tannery" prepared by Geraghty and Miller, Inc. and dated October 28, 1988
- "Detailed Site Evaluation of the Former Trostel and Sons Tannery" prepared by Geraghty and Miller, Inc. and dated January 6, 1989
- "Final Report, Results of Site Investigation Activities, Former Trostel Tannery Site, Milwaukee, Wisconsin" by Jordan, Jones and Goulding, Inc. and dated April 6, 1990
- "Soil and Groundwater Quality Assessment at the Former Trostel Tannery, Milwaukee, Wisconsin" by Chembio Corporation and dated April 1990 (focuses on the current Brewery Works property at the corner of Pleasant Street and Commerce Street).
- "Phase II Environmental Audit/Soil Boring Test Assessment and Groundwater Monitoring Well Assessment" prepared by Braun Intertec and dated March 25, 1991. (focuses on the current Brewery Works property at the corner of Pleasant Street and Commerce Street)
- Several reports prepared by STS Consultants, Ltd., focusing of the Former Trostel Tannery property.
  - "Remedial Investigation Report and Action Plan" dated October 13, 1993 for the Trostel Property prepared by STS Consultants, Ltd.

<b>Site Identification</b>	<b>Past Site Usage Concerns</b>	<b>Potential Contaminants</b>	<b>Additional Sampling Completed</b>	<b>Analytical Testing Completed</b>
<b>Brewery Works</b> (NE Corner of Commerce and Pleasant Streets)	Lumber yard, tannery	Chromium	None additional	None additional
<b>Former Trostel Tannery</b> (1776-1818 Commerce Street)	Tannery	Chromium, DRO, lead	None additional	None additional
<b>Former Gimbels Store</b> (1885 Commerce Street)	USTs	DRO	None additional	None additional
<b>Forestry Building</b> (1872 Commerce Street)	USTs	DRO,GRO, VOCs, metals	None additional	None additional
<b>1980 - 1934 Commerce Street</b>	Coal Storage	PAHs, metals, boron, selenium	None*	None*
<b>1942 Commerce Street</b>	Paving company, coal storage	PAHs, VOCs, metals	2 soil probes groundwater sampling	PAHs, metals, boron, cyanide
<b>2101 - 2113 Humboldt Avenue</b>	USTs, chemical company	PAHs, VOCs, metals	1 soil probe	PAHs, VOCs, metals
<b>200 Walnut Street</b>	Manufacturing, painting	PAHs, VOCs, metals	1 soil probe	PAHs, VOCs, metals, pesticides
<b>2029 - 2057 Commerce Street</b>	Pfister & Vogel hide house	Metals	1 soil probe	Metals
<b>Former Railroad Right-of-Way</b>	Railroad	PAHs, metals	5 soil probes	PAHs, metals, pesticides
	PAHs - Polycyclic Aromatic Hydrocarbons Metals - 8 RCRA metals (total analysis) VOCs - Volatile Organic Compounds DRO - Diesel Range Organics GRO - Gasoline Range Organics USTs - Underground Storage Tanks		* Could not obtain access permission from Owner	

Table 6.2.1 • Sampling Program Summary

- "Practicability Analysis" dated February 11, 1994

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for the Trostel Property prepared by STS Consultants, Ltd.

- "Remediation Activities Documentation" dated April 19, 1995 for the Trostel Property by STS Consultants, Ltd.
- "North Shore 9/10 Collector Systems Contracts C96G11 and C96G21" dated January, 1988 for the Milwaukee Metropolitan Sewerage District Deep Tunnel Project.

A limited Phase II scope of work was developed to assess environmental conditions relating to possible soil and groundwater contamination following the review of the above informational sources. The scope of work included drilling fourteen soil probe borings, analytical testing of soil samples, sampling of five temporary wells and analytical testing of groundwater samples. The field investigation scope of work is summarized in Figure 6.2.1.

The locations of the soil borings completed for this project (GP-1 through GP-15, excluding GP-7) are shown on the attached Figures 6.2.9 and 6.2.10. It should be noted that access permission for the purposes of environmental sampling and testing could not be obtained for the parcels at 1890-1934 Commerce Street and 301 Reservoir Avenue (Barrel Plating Service, Inc.). The results of the soil and groundwater analytical testing are summarized on Tables 6.2.2 through 6.2.8.

The following subsections summarize the past site

activities on individual parcels; soil and groundwater testing results performed on samples from the sites, if any; and conclusions concerning environmental conditions at the sites. The discussion is referenced by site location as indexed on the Figures 6.2.9 and 6.2.10. Further general discussion is presented in Section 4.9 concerning the management of the issues identified.

Readily available, existing information and limited Phase II investigation results were used to develop our opinions on environmental conditions and risks at the following site locations. A thorough review of existing site information and possibly site-specific soil and groundwater testing may be prudent for all of the sites to address purchaser specific concerns. The scope and magnitude of any site-specific investigation will be dependent on the purchaser's risk tolerance related to the known and potential environmental issues. Additional exploration will be necessary to evaluate management alternatives for the soil and groundwater issues identified by this study.

**6.2.2 Individual Property Parcels**

**The Brewery Works**

The site previously contained the Albert Trostel and Sons Company (Trostel) office building which has been razed. No manufacturing processes were believed to occur on this site. Three soil borings for environmental investigation purposes were historically completed on the northern portion of the site and converted to groundwater monitoring wells. Soil and groundwater samples were collected and tested for tannery-related parameters at that time. No additional testing was conducted in conjunction with this Phase II.

Sample Depth	Soil Type	Non-Industrial Direct Contact													
		RCL	GP-1/S-2	GP-2/S-1	GP-3/S-3	GP-4/S-2	GP-5/S-2	GP-6/S-2	G-8/S-3	GP-9/S-2	GP-10/S-2	GP-11/S-2	GP-13/S-1	GP-14/S-1	GP-15/S-2
			2' - 4'	0' - 2'	4' - 6'	2' - 4'	2' - 4'	2' - 4'	4' - 6'	2' - 3'	2' - 4'	2' - 4'	0' - 2'	0' - 2'	2' - 4'
			sandy fill/coal	sandy fill	clayey fill	coal fill	clayey fill	sandy fill	clayey fill	sand	limestone fill	coal fill	sandy fill	sand w/cinders	clayey fill
<b>RCRA Metals</b>															
Arsenic	0.039	4.470	9.760	8.150	15.300	28.500	46.900	4.320	3.400	3.150	12.900	11.800	8.310	4.420	
Barium	NE	22.000	79.000	94.000	48.000	131.000	18.000	28.000	16.000	84.000	81.000	84.000	104.000	34.000	
Cadmium	8	0.190	0.980	0.400	0.400	0.650	0.570	0.160	0.220	0.200	1.500	1.100	0.550	0.160	
Chromium	16000	7.600	41.000	20.000	11.000	42.000	8.700	8.300	10.000	9.900	18.000	18.000	18.000	9.100	
Lead	50	14.000	107.000	133.000	105.000	252.000	12.000	13.000	5.700	69.000	223.000	145.000	29.000	6.200	
Mercury	NE	0.330	0.110	0.330	0.360	0.200	0.097	< 0.087	< 0.083	< 0.087	0.530	0.110	< 0.071	< 0.088	
Selenium	NE	< 0.040	0.280	0.230	2.970	4.290	0.860	< 0.040	< 0.040	< 0.040	0.990	0.950	0.170	0.140	
Silver	NE	< 0.270	0.350	< 0.300	< 0.290	0.560	< 0.300	< 0.280	< 0.280	< 0.290	< 0.310	< 0.290	< 0.270	< 0.280	

All concentrations in mg/kg  
Detected parameters shown in bold

RCL - NR 720, Wisconsin Administrative Code Generic Residual Contaminant Level  
NE - Not established

Table 6.2.2 • RCRA Metals Soil Analytical Testing

Sample Depth	Non-Industrial Direct Contact RCL	Groundwater Protection RCL	GP-1/S-1	GP-3/S-3	GP-4/S-1	GP-5/S-2	GP-6/S-2	GP-8/S-3	GP-9/S-2	GP-10/S-2	GP-11/S-1	GP-12/S-2	GP-13/S-1	GP-14/S-2	GP-15/S-2
			0' - 2'	4' - 6'	0' - 2'	2' - 4'	2' - 4'	4' - 6'	2' - 3'	2' - 4'	0' - 2'	2' - 4'	0' - 2'	2' - 4'	2' - 4'
Soil Type			sandy fill/coal	clayey fill	gravel	clayey fill	sandy fill	clayey fill	clayey fill	limestone	gravel	sandy fill	sandy fill	sandy fill	sandy fill
PAHs															
anthracene	5,000,000.000	3,000,000.000	14,900.000	287.000	< 4.800	439.000	179.000	534.000	< 5.100	12.000	120.000	85.000	48.000	< 7.700	< 4.400
benzo(a)anthracene	88.000	17,000.000	24,600.000	662.000	< 4.800	1,190.000	602.000	180.000	< 5.100	50.000	< 7.900	276.000	147.000	510.000	< 4.400
benzo(a)pyrene	9.000	48,000.000	21,600.000	674.000	< 9.700	1,150.000	939.000	1,030.000	< 10.000	39.000	836.000	329.000	215.000	750.000	< 8.800
benzo(b)fluoranthene	88.000	360,000.000	21,200.000	664.000	< 5.700	994.000	845.000	1,000.000	< 6.000	47.000	982.000	292.000	137.000	795.000	< 5.200
benzo(k)fluoranthene	1,800.000	6,800,000.000	8,610.000	292.000	< 11.000	668.000	587.000	524.000	< 11.000	< 9.800	< 17.000	144.000	< 10.000	852.000	< 9.600
chrysene	880.000	870,000.000	10,500.000	242.000	< 11.000	521.000	401.000	470.000	< 11.000	22.000	423.000	130.000	82.000	378.000	< 9.600
dibenz(a,h)anthracene	8,800.000	37,000.000	25,200.000	736.000	< 4.300	1,310.000	948.000	1,120.000	< 4.500	57.000	< 7.000	738.000	109.000	< 8.800	36.000
fluoranthene	9.000	38,000.000	< 12.000	< 13.000	< 12.000	< 13.000	< 12.000	< 16.000	< 13.000	< 11.000	1,360.000	332.000	207.000	< 19.000	< 11.000
fluorene	600,000.000	500,000.000	118,000.000	3,550.000	39.000	5,660.000	2,970.000	4,160.000	< 11.000	196.000	4,060.000	1,030.000	1,070.000	4,250.000	< 9.600
indene(1,2,3-cd)pyrene	600,000.000	100,000.000	9,270.000	213.000	< 2.600	290.000	< 2.700	170.000	< 2.700	< 2.400	< 4.300	< 2.300	< 2.500	< 4.100	< 2.400
1-methylnaphthalene	88.000	680,000.000	5,100.000	381.000	< 5.300	424.000	355.000	611.000	< 5.600	< 4.900	< 8.700	157.000	121.000	376.000	< 4.800
2-methylnaphthalene	1,100,000.000	23,000.000	< 46.000	< 48.000	< 44.000	< 48.000	< 46.000	< 60.000	< 46.000	< 41.000	< 72.000	< 39.000	87.000	< 70.000	< 40.000
phenanthrene	600,000.000	20,000.000	10,800.000	< 46.000	55.000	< 46.000	< 44.000	439.000	< 45.000	< 40.000	< 70.000	< 38.000	1,080.000	< 68.000	< 39.000
pyrene	18,000.000	1,800.000	59,500.000	1,690.000	< 5.300	2,140.000	843.000	1,450.000	13.000	45.000	825.000	296.000	268.000	1,240.000	< 4.800
	500,000.000	8,700,000.000	65,900.000	3,120.000	< 18.000	5,050.000	1,700.000	2,160.000	< 19.000	304.000	1,850.000	590.000	759.000	2,550.000	< 16.000

All concentrations in mg/kg  
Detected parameters shown in outline

RCL - NR 720, Wisconsin Administrative Code  
NE - Not established  
PAHs - polycyclic aromatic hydrocarbons

Table 6.2.3 • Polycyclic Aromatic Hydrocarbon Analytical Testing

Fill soil was encountered in the upper portion of the soil profile as indicated on the soil boring logs. The fill soil included some wood chips but no materials which would be considered non-exempt solid wastes according to NR 500, Wisconsin Administrative Code (WAC) were noted. Some tannery-related parameters (chromium compounds in particular) were detected in the soil samples tested, however, the concentrations quantified were below current Generic Non-Industrial Direct Contact NR 720, Wisconsin Administrative Code Residual Contaminant Levels (Direct Contact RCLs). Groundwater had detectable chromium, but at concentrations below the NR 140, WAC Enforcement Standard (ES).

Existing information does not suggest site environmental challenges which would significantly encumber redevelopment of the property. A groundwater use restriction may be proposed for this property. This restriction would not hinder development since the area is served by municipal water and sewer. Thus, the rationale for such a restriction is questionable.

**Former Trostel Tannery**

A series of environmental investigations and remedial activities have been previously completed to address contamination related to the historical tannery operations at the site. Given the current status of the site, additional Phase II investigation in conjunction with the Beer Line "B" project was not undertaken. The current remediation status of the property is summarized in a letter by STS Consultants to the Wisconsin Department of Natural Resources (WDNR)

dated September 28, 1995 and the subsequent WDNR response letter dated February 5, 1996.

Certain tannery-related wastes remain in the area of the former tannery buildings, particularly at the lowest levels of the former buildings present on the site. (These areas are now overlain by six feet of construction demolition materials). An agreement with WDNR to limit excavation for development in the central portion of the site, as shown on the attached Figure 6.2.11, has been made. Additional site redevelopment challenges are presented by a 25 foot wide limited development zone along the Milwaukee River and the southern property line (limiting the construction of permanent features which would preclude future possible excavation in this area) and an area of lead-affected soil in the northern portion of the site which will require a direct-contact barrier with the existing soil. Specific site development plans addressing these environmental issues will need to be submitted to the WDNR for approval during the planning process to assure compliance with environmental regulations.

Existing information identifies current environmentally-related restrictions of redevelopment at the site. These restrictions may affect site and building layout and structural support selection, but do not preclude development. Deed restrictions and groundwater use restriction will likely be required under the current redevelopment restrictions imposed by WDNR. These restrictions assume no further remediation of soil and/or groundwater for redevelopment, except for proper management of soils encountered during construction. Potential future liability associated with site ownership may exist and needs to be addressed by

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		Groundwater Protection Generic RCL					
		GP-2/S-3	GP-4/S-1	GP-8/S-8	GP-10/S-2	GP-12/S-5	GP-14/S-3
<b>Sample Depth</b>		4' - 6'	0' - 2'	14' - 16'	2' - 4'	8' - 10'	4' - 6'
<b>Soil Type</b>		Coal fill	Gravel	Fill - PID reading	Limestone	Clayey fill	Sandy fill
<b>VOCs</b>							
ethylbenzene	2,900.000	46.000	< 4.500	< 4.500	< 4.500	< 4.500	< 4.500
naphthalene	NE	160.000	< 7.100	< 7.100	38.000	< 7.100	< 7.100
styrene	NE	< 15.000	< 15.000	< 15.000	67.000	< 15.000	< 15.000
toluene	1,500.000	148.000	< 4.200	< 4.200	< 4.200	< 4.200	< 4.200
1,2,4-trimethylbenzene	NE	67.000	< 9.900	< 9.900	< 9.900	< 9.900	< 9.900
1,3,5-trimethylbenzene	NE	26.000	< 10.000	< 10.000	< 10.000	< 10.000	< 10.000
m&p xylene	4,100.000	158.000	< 19.000	< 19.000	< 19.000	< 19.000	< 19.000
o-xylene	*	72.000	< 9.000	< 9.000	< 9.000	< 9.000	< 9.000
All concentrations in mg/kg Only detected parameters shown		RCL - NR 720, Wisconsin Administrative Code Generic Residual Contaminant Level NE - Not established VOCs - volatile organic compounds by EPA method 8021 * - RCL for summation of m&p xylene and o-xylene					

Table 6.2.4 • Volatile Organic Compounds Analytical Testing

a potential purchaser.

**Former Gimbel's Store**

This site is currently under redevelopment by the property owner and, as such, no Phase II work was completed by STS. Existing information does not suggest environmental challenges which would significantly encumber additional redevelopment of the property.

**City Forestry Building**

Subsurface soil and groundwater investigation activities have been completed at the subject site to explore environmental issues associated with two former underground storage tanks (gasoline and fuel oil). Impacts associated with the fuel oil tank were apparently remediated by excavating approximately 12 tons of petroleum-affected soil. Closure from the WDNR has been requested for the fuel oil tank. Benzo(a)pyrene above a direct contact RCL remains in soil from this area of the site, however, dermal contact is apparently prevented by the overlying soil.

The extent of soil contamination associated with the former gasoline tank has been defined and remediated according to Giles Engineering. Delineation of the extent of groundwater contamination from the tank is also ongoing.

As a result of the previous site investigation activities, low-level metals contamination of soil and groundwater

with selenium, chromium and arsenic has been identified. Further resolution of the magnitude and extent of metals-affected soil is being pursued by the City of Milwaukee, the property owner. A Phase II investigation was not completed on this site for the Beer Line "B" project.

Environmental challenges at the site have been resolved. The site has been sold to the Lakefront Brewery and has been redeveloped as a micro-brewery.

**1890-1934 Commerce Street**

This area of Beer Line "B" was historically used by several fuel companies for storing coal. The historical storage of coal on the site could result in residual impacts to soil and groundwater on-site (i.e., PAHs, boron, metals and/or cyanide). Access to the site for soil sampling associated with this project was denied by the site owner and, as a result, no site-specific analytical testing data is available. The environmental risk associated with this site is therefore, undefined at this time.

There were, however, several borings completed on the property for the Deep Tunnel Project and soil boring logs were reviewed to aid in assessing possible soil conditions at the site. The soil boring information identified fill on the site consisting of natural soil material (i.e., clay, sand, etc.) and cinders. The fill thickness ranged between 0 feet and 14 feet with an average thickness of approximately 8 feet. Cinders were identified at times in distinct layers up to 4 feet thick

and also mixed with natural fill soil. Cinders are considered non-exempt solid waste under NR 500, WAC; and, as such, (under current regulations) would require “an exemption to NR 500, WAC to construct on an abandoned landfill” if left in-place. If removed, the cinders would need to be characterized and a Materials Handling Plan prepared.

The presence of cinders on the site in combination with the undefined environmental risk present a redevelopment challenge. The incremental cost of redevelopment associated with environmental issues at this site could range over several orders of magnitude and are, therefore, a critical aspect of any economic evaluation of redevelopment opportunities.

If the cinders are left in-place, the site could remain on a registry of abandoned landfills in the state. The current Purchaser Protection Program (Act 453 of Wisconsin State Statutes) applies to “spill law” sites, and has not been broadened to include abandoned landfill (i.e., NR 500, WAC) sites. There may be, therefore, potential future liability associated with site ownership at this time. The WDNR and interested parties are currently looking at ways to extend Purchaser Protection to “Brownfields” site where widespread non-natural fill materials (i.e., foundry sand, ash, etc.) are present.

**1942 Commerce Street**

The property was historically used by fuel companies, a trucking terminal, a paving company and for coal storage, according to historical information presented by the City of Milwaukee Phase I Environmental Assessment Report. In addition, a historical soil boring completed in Commerce Street west of the site in 1985 identified a petroleum odor in the soil at approximately 10 feet below grade.

Two soil probes (GP-2 and GP-3) were completed on this parcel for this Phase II and a groundwater sample was collected. Analytical soil testing was completed for metals, cyanide, boron and PAHs and groundwater was tested for metals (See Tables 6.2.2 and 6.2.3). Fill soil including coal was encountered at the soil probe locations to a depth of 10 feet below grade. Coal may be considered a non-exempt solid waste under NR 500, WAC (see discussion of non-exempt solid waste fill sites under Section 6.2.5). Low levels of cyanide and boron were detected in fill soil. Metals and PAHs were quantified in the fill soil above non-industrial direct contact RCLs. VOCs were quantified in soil from GP-2,

VOCs	ES	PAL	GP-8	GP-12	Trip Blank
sec-butylbenzene	NE	NE	6.400	< 0.200	< 0.200
tert-butylbenzene	NE	NE	0.800	< 0.400	< 0.400
ethylbenzene	<b>700.000</b>	<b>140.000</b>	0.400	< 0.200	< 0.200
isopropylbenzene	NE	NE	0.600	< 0.200	< 0.200
p-isopropyltoluene	NE	NE	8.700	< 0.300	< 0.300
naphthalene	<b>100.000</b>	<b>20.000</b>	0.900	< 0.500	< 0.500
n-propylbenzene	NE	NE	1.200	< 0.200	< 0.200
toluene	<b>343.000</b>	<b>68.600</b>	2.200	0.500	< 0.400

All concentrations in ug/l **33** - ES Exceedance  
 Detected parameters shown in bold **22** - PAL Exceedance  
 Only detected parameters shown

ES - NR 140, Wisconsin Administrative Code Enforcement Standard  
 PAL - NR 140, Wisconsin Administrative Code Preventive Action Limit  
 NE - Not established

Table 6.2.5 • VOCs Groundwater Analytical Testing

but were below groundwater protection-based RCLs. The detection of VOCs may be related to the petroleum odors noted on the 1985 soil boring log. No metals were quantified in the groundwater sample from GP-3 above NR 140, Wisconsin Administrative Code regulatory limits. The absence of groundwater exceedances for metals suggests that the affected soils may be able to be managed on-site using WDNR performance-based closure guidance, rather than in-situ or ex-situ treatment and/or disposal. A performance-based closure could result in a deed restriction and/or engineering controls (i.e., barrier) to prevent direct contact with affected soils.

Existing information identifies environmental challenges at the site which may encumber, but not prevent, redevelopment of the property and may affect potential future liability associated with site ownership.

**2000-2056 Commerce Street**

The property was historically used by fuel companies, a paving company and for coal storage, according to historical information presented by the City of Milwaukee Phase I Environmental Assessment Report. Four soil probes (GP-4, 5, 6 and 8) were completed on this parcel and groundwater samples (GP-5, 6 and 8) were collected from three locations. Analytical soil testing was completed for metals, cyanide, boron and PAHs and groundwater was tested for metals (See Tables 6.2.2 and 6.2.3).

Fill soil including coal was encountered at the soil probe locations. Coal may be considered a non-exempt solid waste under NR 500, WAC (see discussion of non-exempt solid waste fill sites under Section 6.2.5). Low levels of cyanide and boron were detected in fill soil. Metals and PAHs were quantified above direct contact RCLs. Lead and arsenic were quantified in one

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groundwater sample above the NR 140, WAC PAL, but below the ES (Table 6.2.7). VOCs were also quantified in one groundwater sample, but all parameters detected were below NR 140, WAC regulatory limits. VOCs were not quantified in soil in the two soil samples tested.

The occurrence of lead and arsenic above direct contact RCLs in soil in combination with the presence of these elements above groundwater standards on this parcel suggests that additional evaluation will be necessary on this site in order to determine what remediation, if any, may be necessary.

Existing information identifies environmental challenges at the site which may encumber, but not prevent, redevelopment of the property and may affect potential future liability associated with site ownership. A performance-based closure could result in a deed restriction and/or engineering controls (i.e., barriers) to prevent direct contact with affected soils. Remediation may also be necessary.

**2101-2113 North Humboldt Avenue**

Past uses of the property were identified as a “lime house” and the National Aniline & Chemical Company. One soil probe (GP-10) was completed on this parcel. The soil was tested for metals, VOCs, and PAHs. (see tables 6.2.2 through 6.2.4) The analytical testing for soil quantified metals and benzo(a)pyrene above direct contact RCLs. VOCs were detected in soil, but below groundwater protection RCLs. Groundwater was not tested on the parcel.

Existing information identifies environmental challenges at the site which may encumber, but not prevent, redevelopment of the property. See Section 4.9.2 for further discussion of these issues.

**200 Walnut Street**

This area was formerly occupied by Badger Sash and Door Co. and various other businesses. One soil probe (GP-14) was completed in this area and a soil sample was tested for metals, PAHs, VOCs and pesticides (Tables 6.2.2, 6.2.4, and 6.2.6). The soil encountered in this area included some slag and cinders. Slag and cinders are considered non-exempt solid wastes under NR 500, WAC. Arsenic and several PAHs were quantified above direct contact RCLs. VOCs and pesticides were not detected.

Existing information identifies environmental

Sample Depth	0' - 2'	2' - 4'
<b>Soil Type</b>	clayey fill	sandy fill
<b>Pesticides</b>		
EPTC	< 4.200	< 4.200
butylate	< 5.200	< 5.200
trifluralin	< 3.700	< 3.700
propachlor	< 4.500	< 4.500
diamino atrazine	< 7.900	< 7.900
atrazine desethyl	< 5.300	< 5.300
atrazine desisopropyl	< 5.500	< 5.500
prometon	< 3.800	< 3.800
propazone	< 5.000	< 5.000
atrazine	< 5.100	< 5.100
simazine	< 5.200	< 5.200
atrazine	< 5.800	< 5.800
alachlor	< 5.800	< 5.800
metribuzin	< 6.800	< 6.800
metolachlor	< 13.000	< 13.000
pendimethalin	< 4.900	< 4.900
cyanazine	< 5.300	< 5.300
anilazine	< 7.500	< 7.500
napropamide	< 4.200	< 4.200
velpar	< 7.100	< 7.100

All concentrations in ug/kg

Table 6.2.6 • Soil Pesticide Testing

challenges at the site associated with managing fill soil which may encumber redevelopment of the property and may affect potential future liability associated with site ownership. See Section 4.5.2 for further discussion of these issues.

**2029-2057 Commerce Street**

A tannery “hide house” was historically present on this parcel and one probe (GP-9) was completed on this parcel. Soil was tested for metals and PAHs (Table 6.2.3). Arsenic was quantified above direct contact RCLs, but within a typical background level range observed in Wisconsin. No PAHs above direct contact RCLs were quantified.

Existing information from one boring identifies minimal environmental challenges at the site which may

RCRA Metals	ES	PAL	GP-1	GP-3	GP-5	GP-6	GP-8	GP-12
Arsenic	50.000	5.000	1.000	< 1.000	< 1.000	< 1.000	5.000	< 1.000
Barium	2,000.000	0.400	122.000	26.000	22.000	19.000	237.000	294.000
Cadmium	5.000	0.500	< 0.500	0.200	< 0.100	0.300	< 0.100	0.300
Chromium	100.000	10.000	< 0.400	< 0.400	< 0.400	0.800	3.600	0.600
Lead	15.000	1.500	< 1.000	< 1.000	< 1.000	< 1.000	3.000	6.000
Mercury	2.000	0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
Selenium	50.000	10.000	0.800	3.000	< 0.800	< 0.800	< 0.800	< 0.800
Silver	50.000	10.000	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400

All concentrations in ug/l  
 Detected parameters shown in bold

ES - NR 140, Wisconsin Administrative Code Enforcement Standard  
 PAL - NR 140, Wisconsin Administrative Code Preventive Action Limit

Table 6.2.7 • RCRA Metals Groundwater Analytical Testing

encumber redevelopment of the property.

**Former Railroad Right-of-Way**

This area was used as railroad right-of-way from the 1800’s until the 1960’s and has been fallow since this time. Concerns along the former railroad right-of-way relate to possible spillage or leakage from the railroad activities on the property. Soil probes GP-1, GP-11, GP-12, GP-13 and GP-15 were completed in this area. Soil samples were tested for RCRA metals, PAHs, VOCs, and pesticides (Tables 6.2.2 and 6.2.6). Groundwater samples were collected from temporary wells and tested for RCRA metals and VOCs (one only) (Tables 6.2.2, 6.2.4, 6.2.5, 6.2.6, and 6.2.7.).

Metals and PAHs were quantified above direct contact RCLs. VOCs were not quantified in soil in the one soil sample tested. Lead was quantified in the groundwater sample above the NR 140, WAC PAL. VOCs were not quantified in the groundwater sample. No pesticides were quantified in the soil sample. The absence of groundwater ES exceedances for metals suggests that the affected soils may be able to be managed on-site using WDNR performance-based closure guidance rather than in-situ or ex-situ treatment and/or disposal. A performance-based closure could result in a deed restriction and/or engineering control (i.e., barrier) to prevent direct contact with affected soils.

Existing information identifies environmental challenges at the site which may encumber, but not prevent, redevelopment of the property and may effect potential future liability associated with site ownership.

**6.3 Existing Geotechnical Conditions**

**6.3.1 General Geology**

The study area is situated along the western banks of the Milwaukee River Valley. The earth materials consist of Quaternary deposits of fill, post-glacial and glacial soils overlying Devonian age bedrock.

**Valley Fill** - Fill soil and materials cover nearly all of the study area. Within the low area along Commerce Street from the edge of the bluffs to the river, the fill was placed over once lower marshy river and estuarine deposits and over former paths of the river and a canal called the Rock River Canal. The approximate location of the former river bank, canal and estuarine/river valley deposits is shown on Figures 6.3.2 and 6.3.3. The fill soils consist of a mixture of clay, silt, sand and gravel with varying amounts of cinders, coal, building demolition debris and other materials. Fill deposits in the low area generally range from a few feet to over 20 feet in thickness and typically are in the range of 10 to 15 feet in thickness.

**Bluff Fill** - Fill deposits also cover much of the bluff area. The bluff fills are mostly associated with construction of railroad benches and roadways. The bluff is terraced from construction of benches and retaining walls. Fills were placed behind the retaining walls. Available data indicates that most of the fill is silty clay that is likely reworked glacial till. Fill deposits in the bluff area generally range from a few feet to 20 feet in thickness.

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	GP-2/S-1	GP-2/S-3	GP-3/S-2	GP-3/S-3	GP-5/S-1	GP-5/S-2	GP-6/S-1	GP-6/S-2
<b>Sample Depth</b>	0' - 2'	4' - 6'	2' - 4'	4' - 6'	0' - 2'	2' - 4'	0' - 2'	2' - 4'
<b>Soil Type</b>	sandy fill/coal	coal	clayey fill	clayey fill	clayey fill	clayey fill	sandy fill	sandy fill
<b>Total Cyanide</b>	—	0.020	0.050	—	0.050	—	< 0.200	—
<b>Total Boron</b>	15.000	—	—	12.000	—	6.700	—	4.200
	— not tested							

Table 6.2.8 • Boron and Cyanide Soil Analytical Testing

**Valley Post-Glacial Soils** - In the low area, the fill is underlain by post-glacial soils and glacial soils. The post-glacial soils generally consists of estuarine deposits and alluvial deposits. The estuarine deposits are soft to stiff organic silts and clays that were once marshy backwater soils. The estuarine deposits typically range in thickness from 1 to 10 feet. The estuarine deposits are adjacent to and underlain by alluvial deposits consisting of loose to medium dense silty sand and gravel. Between Commerce Street and the river dockwall, the post-glacial deposits generally extend to depths in the range of 20 to 30 feet.

**Valley Glacial Soils** - The post-glacial soils are underlain by predominantly cohesive glacial soils. The glacial soils consist mostly of very stiff to hard silty clay till. The tills are occasionally interbedded with lacustrine silt and clay deposits and outwash sand and gravel deposits. The glacial soils extend to bedrock. In the low area, bedrock depth generally varies from 50 to 65 feet.

**Bluff Glacial Soils** - The bluff fill deposits are underlain by predominantly cohesive glacial soils. The glacial soils consist mostly of very stiff to hard silty clay till. The tills are occasionally interbedded with lacustrine silt and clay deposits and outwash sand and gravel deposits. The glacial soils extend to bedrock. Along the top of the bluff, bedrock depth generally varies from 100 to 130 feet.

**Bedrock** - Bedrock in the study area consists of Devonian age rock called the Milwaukee Formation and Thiensville Formation. The Milwaukee Formation is a predominantly dolomite with frequent argillaceous layers. The Milwaukee Formation ranges in thickness from 20 to 50 feet and is typically found within an elevation range of -40 to -90 feet, Milwaukee City Datum. The Thiensville Formation underlies the Milwaukee Formation. It has a thickness in the range of 65 to 75 feet and is typically found within an elevation range of -150 to -170 feet, Milwaukee City Datum.

**6.3.2 Soil and Groundwater Conditions**

Soil conditions in the study area were assessed using the general geologic information that was previously discussed and using available boring logs. Approximately 90 boring logs were found and are located as shown in Figures 6.3.4 and 6.3.5. The borings are not attached to this report, but may be found attached to a June 25, 1995 letter report addressed to Mr. Mike Wisniewski of the City of Milwaukee.

The soil conditions in the study area can be generalized into three zones. The approximate boundaries of these zones are shown in Figures 6.3.4 and 6.3.5. Zone A soils border the river along most of the study area. Zone B soils are found along Commerce Street and along the river towards Humboldt Avenue. Zone C soils are bluff soils which are located west of Commerce Street.

**I. Zones**

**Zone A Soils**

Zone A soils generally consist of loose, miscellaneous fill overlying relatively compressible organic silt and clay, and then loose to medium dense sand. These soils are generally found along the river dockwall and extend part or all of the way to Commerce Street. Zone A soils are considered relatively compressible and generally unsuitable for support of the proposed development structures on shallow foundations unless suitable ground improvement is performed. The Zone A soils typically consist of the following general strata:

- **Fill** Fill in this zone generally consists of a mixture of cohesive soil (silt and clay) , granular soil (sand and gravel) and rubble fill (building debris, rubble, pavement chunks, etc.). The fill consistency and density varies from soft to hard and from loose to dense. The majority of the fill is considered to be in a loose or soft condition and is therefore, moderately compressible. The fill deposits generally range from a

RefNo	Structure Description	Foundation Description	Structure/Foundation Status
1	Pleasant St. Bridge, City of Milwaukee	Piles, type unknown	In active use
2	Tarp Covered Concrete Bin	Unknown, probably shallow spread footings	In active use
3	NS-8 Junction Chamber, Trash Rack, Odor Control Building, Approach Channel, Vent Shaft and Drop Shaft, MMSD	Deep mat footings bearing on glacial tills, all structures are underground except Odor Control Building	In active use
4	Former Trostel and Sons Tannery, 1776 N. Commerce St., 8&12 stories	Piles, type unknown	Building was demolished after 1990, pile caps and piles were abandoned and buried.
5	Former Trostel and Sons Tannery Warehouse, 1818 N. Commerce St. 1 story		Building was demolished after 1990. Foundations were not removed.
6	Former Gimbel's warehouse, presently under renovation to be a residential building, 1858 N. Commerce St., 8 stories	Probably piles or drilled shafts, type unknown	Building along river in active use-being renovated.
7	Former Gimbel's warehouse buildings along Commerce St., presently being demolished to make parking space, 1858 N. Commerce St.	Probably piles	Demolished, foundations left in place.
8	Former City of Milwaukee Forestry Building, 1872 N. Commerce, 3-1/2 stories	Piles, type unknown	Inactive, but still standing
9	Holton St. Viaduct	Piles, type unknown	In active use
10	NS-7 Junction Chamber, Trash Rack, Odor Control Building, Approach Channel, Vent Shaft and Drop Shaft, MMSD	Deep mat footings bearing on glacial tills, all structures are underground except Odor Control Building	In active use
11	Rowing Club Building, 2000 N. Commerce, 1 story	Probably shallow spread footings	In active use
12	Detention Tank/Demonstration Treatment Plant, 2050 N. Commerce St., Underground and 1&2 Stories	Tank on mat foundations, buildings probably on spread footings	Abandoned after 1990, extent of foundation removal unknown.
13	Ace Services Building, 2062 N. Commerce St., 1 story	30" diameter drilled shafts	In active use
14	Johnson Products Co. Inc., 2072 N. Commerce St., 1 story	30" diameter drilled shafts	In active use
15	Former Wiesel Sausage Plant, 2113 N. Humboldt Ave., 1 & 2-1/2 stories	Probably shallow spread footings	Demolished since 1990, status of foundation removal unknown
16	MMSD Humboldt Access Shaft and Odor Control Structure	Shaft extends 300 feet deep and into rock, odor control building is founded on shallow spread footings	In active use
17	Humboldt Bridge over Commerce St.	Concrete retaining wall on spread footings	In active use
18	Humboldt Ave. Bridge over Milwaukee River	Probably on piles	In active use

Table 6.3.1 • Summary of Previous and Existing Structure Foundation Information • See Figures 6.3.6 and 6.3.7

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few feet to over 20 feet in thickness and typically are in the range of 10 to 15 feet in thickness.

- **Estuarine Deposits** The Estuarine Deposits consist of organic silt and clay that are the former river valley marsh soils. The estuarine deposits typically range in thickness from 1 to 10 feet. The estuarine soils generally have a consistency ranging from soft to stiff and are moderately to highly compressible. Decay of the organic material in these soils is a known source of methane gas. Methane gas may be trapped in granular pockets within or below the layer and may also be dissolved in the surrounding groundwater.
- **Alluvial Deposits** The Alluvial Deposits consist of silty sand and gravel that formed in a flowing river environment. The density of the Alluvial Deposits typically ranges from loose to medium dense with a tendency to increase in density with depth. The Alluvial Deposits generally range in thickness from a few feet to over 20 feet with the thicker deposits found towards the southern end of Zone A. The Alluvial Deposits are considered to have low to moderate compressibility. Portions of the alluvial soils may be suitable for support of light to moderately loaded structures
- **Glacial Deposits** The Glacial Deposits generally consist of silty clay and clayey silt that has a very stiff to hard consistency. The till has a low relative compressibility and generally would be a suitable foundation subgrade for buildings of the type being proposed. The glacial tills are typically 20 to 30 feet thick in Zone A and are found below a depth of approximately 20 to 30 feet.

### Zone B Soils

Zone B soils generally consist of loose to medium dense granular fill or medium to hard cohesive soil overlying glacial till. A significant difference with Zone A soils is that Zone B soils do not include the moderately to highly compressible estuarine deposits. These soils are generally found along Commerce Street. Zone B soils are considered to have low to moderate compressibility. They are generally unsuitable for support of the proposed development structures on shallow foundations unless suitable ground improvement is performed. The Zone B soils typically consist of the following general strata:

- **Fill** Fill in this zone generally consists of a mixture of

cohesive soil (silt and clay) , granular soil (sand and gravel) and rubble fill (building debris, rubble, pavement chunks, etc.). The fill consistency or density varies from soft to hard and from loose to dense. The majority of the fill is considered to be in a loose or soft condition and is therefore, moderately compressible. The fill deposits generally range from a few feet to over 20 feet in thickness and typically are in the range of 10 to 15 feet in thickness.

- **Alluvial Deposits** The Alluvial Deposits consist of silty sand and gravel that formed in a flowing river environment. The density of the Alluvial Deposits typically ranges from loose to medium dense with a tendency to increase in density with depth. The Alluvial Deposits generally range in thickness from a few feet to over 20 feet with the thicker deposits found towards the southern end of Zone B. The Alluvial Deposits are considered to have low to moderate compressibility. Portions of the alluvial soils may be suitable for support of light to moderately loaded structures.
- **Glacial Deposits** The Glacial Deposits generally consist of silty clay and clayey silt that has a very stiff to hard consistency. The till has a low relative compressibility and generally would be a suitable foundation subgrade for buildings of the type being proposed. The glacial tills are typically 20 to 40 feet thick in Zone B and are found below a depth of approximately 10 to 20 feet.

### Zone C Soils

Zone C soils generally consist of very stiff to hard cohesive fill overlying cohesive glacial till. A significant difference with Zone A and B soils is that Zone C soils do not include the moderately to highly compressible estuarine deposits or the low to moderately compressible alluvial deposits. In addition, the fill tends to be harder and has much less rubble content. These soils are generally found along the bluff. Zone C soils are considered to have low to moderate compressibility. They may be suitable for support of the proposed development structures on shallow foundations if constructed in a manner that preserves slope stability. The Zone C soils typically consist of the following general strata:

- **Fill** Fill in this zone generally consists of cohesive soil (silt and clay) with a lesser amount of granular soil (sand and gravel) and only a trace or small

pockets of rubble fill (building debris, rubble, pavement chunks, slag etc.). The fill consistency generally varies from very stiff to hard. The fill deposits generally range from a few feet to over 15 feet in thickness and typically are in the range of 5 to 10 feet in thickness.

- **Glacial Deposits** The Glacial Deposits generally consist of silty clay and clayey silt that has a very stiff to hard consistency. The till has a relatively low compressibility and would generally be a suitable foundation subgrade for buildings of the type being proposed, provided that bluff and retaining wall stability is maintained. The glacial tills are typically 70 to 110 feet thick in Zone C and are found below a depth of approximately 5 to 15 feet.

## II. Groundwater

### Zone A and B Groundwater Conditions

The groundwater table within the valley areas of Zones A and B is typically found at and within a few feet above the Milwaukee River level. The water levels are based on the large number of borings and wells that exist or once existed in this area. Generally a slight horizontal gradient towards the river is present. Water levels in this area are likely to fluctuate with river level fluctuations. The Zone A and B fill and alluvial deposits generally have a moderate to high permeability, therefore may yield moderate to high inflow rates within excavations below the water table unless a cutoff wall or groundwater isolation barrier is constructed.

Progressively lower groundwater levels are present within the glacial and bedrock aquifers in this area. These lower levels are mostly caused by infiltration into the Milwaukee Metropolitan Sewerage District's Northshore Interceptor deep tunnel.

### Zone C Groundwater Conditions

The groundwater table within the bluff areas of Zones A and B is estimated to range from near the ground surface at some steeply sloped areas (a spring) to over 20 feet deep along the crown of the bluff and along some of the bluff benches. Very few borings and wells are available for this area, therefore the bluff water table level has considerable uncertainty. Generally, the groundwater table is expected to slope downward along the bluff and towards the river. The Zone C fill and pockets of granular soil or outwash interbedded with

the glacial till deposits have the highest permeability and may yield inflows into excavations that require pumping. However, in general, the Zone C soils have a relatively low permeability and are not expected to yield large quantities of water into excavations of the type expected for the proposed development.

### 6.3.3 Previous and Existing Foundations, Excavations, and Underground Structures

#### Previous Canal and River Bank

Based on various historical references, a canal was dug through the study area in the late 1830's. The canal was to have extended to the Rock River, but the project was abandoned after reaching approximately West McKinley Ave. The approximate locations of the former Rock River Canal and Milwaukee river banks area based on old City plans shown on Figures 6.3.2 and 6.3.3. After the canal was partially completed, grist and flour mills, foundries and factories were constructed along its banks. In the study area, most of these buildings were located east of the canal. In 1884, the canal was filled and paved to become Commerce Street. The significance of the canal location for new development is the fill material that was placed in it and the former materials that lined the bank. Available boring logs located in the canal area suggest that it was mostly filled with silts and clays, a lesser amount of sand and gravel, and to some extent with cinders, slag and other waste materials. These materials were apparently not compacted. Borings located over the former canal alignment generally indicate that most of the canal backfill is a loose or soft state and therefore is relatively compressible.

Figures 6.3.2 and 6.3.3 also show that the former Milwaukee river bank was located a few feet to a few tens of feet northwest of its present dockwall location. One portion of the old river bank was encountered in 1988 when an excavation was being completed for the MMSD NS-7 Approach Channel. Boulders were found at depths ranging from 10 to 15 feet deep along what appeared to be the former river bank. They had apparently been used for bank rip rap. Buried boulder rip rap may also be present at other former river bank locations in the study area.

#### Previous and Existing Structure Foundations

Available records on previous and existing structure foundations in the study area were reviewed. The

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locations of these structures are shown on Figures 6.3.6 and 6.3.7. A summary of available information is listed in Table 6.3.1. Note that these figures and tables do not contain information on many much older structures that once existed in the area. Information on much older structures may be found in a May 28, 1997 document entitled "Phase I Environmental Assessment of the "Beer Line B" Project Site, Milwaukee, Wisconsin" that was prepared by the City of Milwaukee. The type of foundation and extent of foundation abandonment for most of the older structures are unknown. We believe that at least some of the much older structures were founded on timber piles. Scattered zones of abandoned timber piles and pile caps are likely throughout the area between Commerce Street and the river.

Table 6.3.1 shows that most of the listed buildings and bridges are founded on piles or drilled shafts. Deep foundations were the generally adopted foundation solution for the type of structures that exist or previously existed in soil Zones A and B.

Table 6.3.1 also indicates that abandoned foundations are likely to exist at the former Trostel Tannery building (Ref. No. 7) and at the former warehouse building (Ref. No. 8). Available information indicates that the Trostel building foundations were not abandoned with superstructure demolition. Basement and excavated areas were apparently filled with building rubble and then leveled. The rubble and buried foundations will be an impediment to future development in these areas.

Additional sources of underground obstructions in the are between Commerce Street and the river are the river dockwall and retainage system and the existing retaining walls. Portions of the dockwall are tied-back to anchor piles. These piles are typically located 20 to 40 feet behind the dockwall. A more detailed discussion of dockwall conditions is presented in Section 3.4. Retaining walls are discussed below.

**Retaining Walls**

Numerous retaining walls exist in the study area. Most of them are located in the bluff area west of Commerce Street. A lesser number are located between Commerce Street and the River. The bluff area retaining walls were constructed to form benches in the bluff for railroad tracks or to allow roadway construction along the bluff.

A complete summary of the known retaining walls in the study area is contained in a July 1990 report by

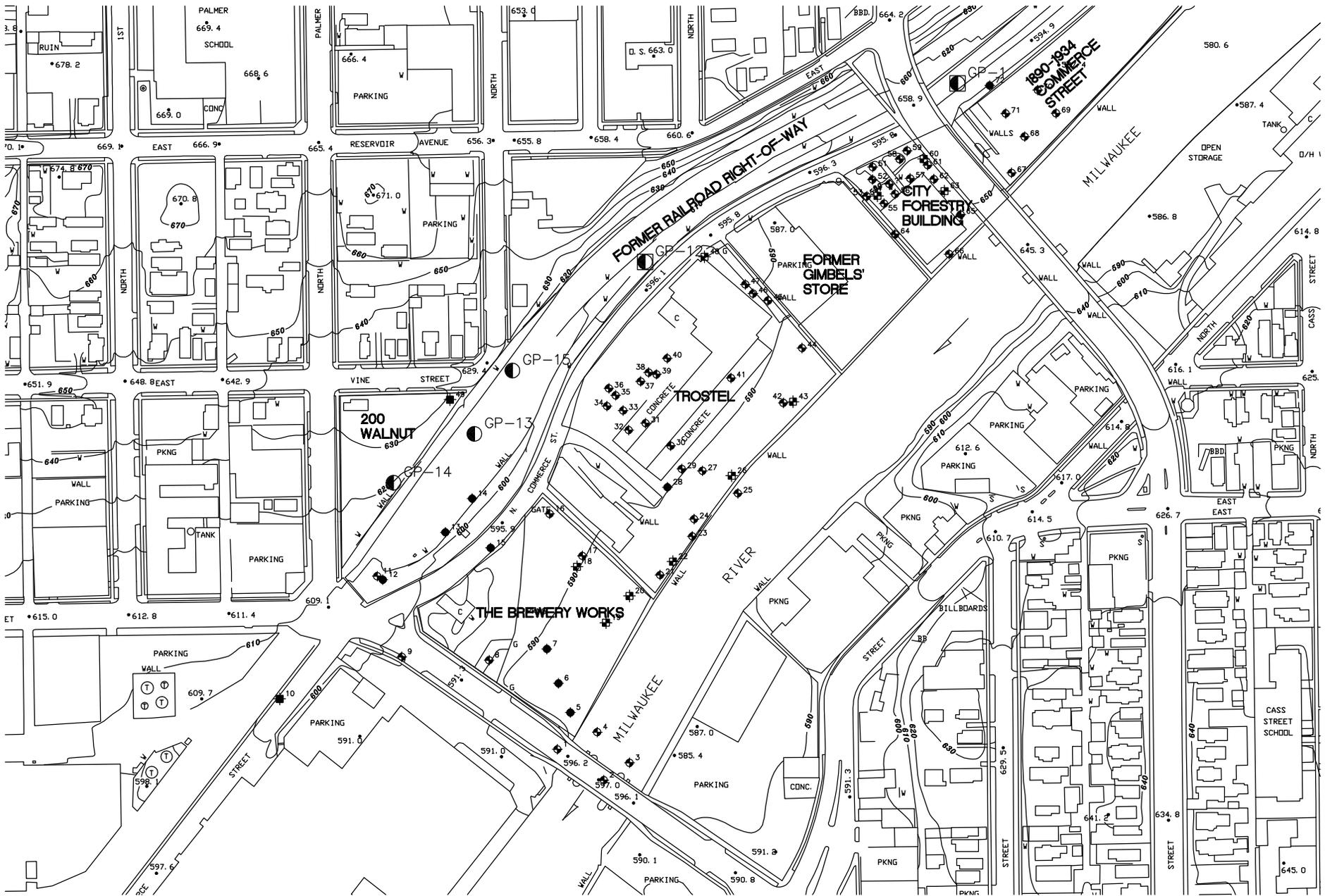
HNTB Corporation that is entitled "Beer Line "B" Site Study - Report on Training Walls, Dockwall and Roadways within the Study Site." The report shows retaining wall locations and lists retaining wall material types, lengths, and retained soil heights. The physical conditions which could be observed are described. Recommendations on continued use, repair or replacement were made.

The 1990 Study did not obtain drawings showing wall types and did not assess retaining wall stability except for obvious movements or signs of distress. We were able to obtain additional information on some of these walls. One of the longest walls, 1,750 feet, called Retaining Wall G appears to have been constructed in the late 1940's in association with construction of the Holton Street Viaduct. City of Milwaukee record drawings for portions of the retaining wall were found. These drawings show that the wall is a cantilevered, reinforced concrete wall that is founded on relatively shallow strip footings. The HNTB report indicate that this wall is in "satisfactory" conditions and exhibited no signs of movement or instability. The City of Milwaukee drawings show that the wall was designed with appropriate safety factors for resisting earth forces and railroad track surcharge loads. This information could be used to assess possible new development on the benches above and below it.

Plan sheets were not found for the other retaining walls. Records on some of these walls may exist in archived files of the railroad company which formerly owned the land, but would be very difficult to locate. Based on the information in the HNTB report, the referenced City of Milwaukee plans and our own visual observations we estimate that the other concrete retaining walls are generally gravity and/or footing supported structures. We found no evidence of tie-rod or anchor systems behind the concrete walls.

The steel retaining walls appear to be cantilevered sheet pile walls. No signs of tie-rods or anchor systems were found. Depths of the sheetpiles are not known, but can be determined by non-destructive, geophysical testing. Sheetpile section size may be determined by measuring sheet dimensions and thickness. With sheetpile section and length information, reuse of sheets to retain deeper cuts or new development surcharge loads can be assessed.

The HNTB report identifies retaining walls which are in

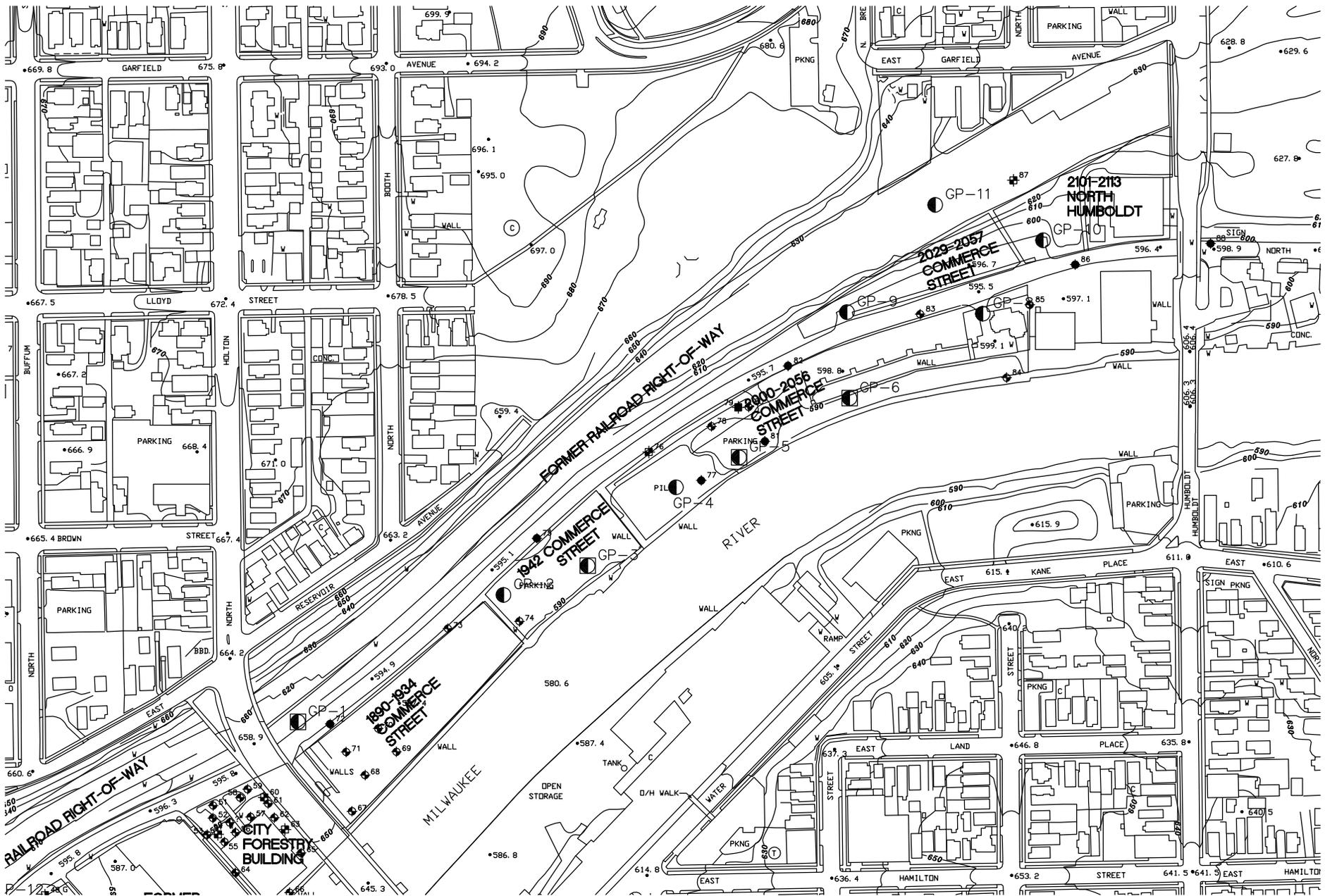


**LEGEND**

- GP-4 ● SOIL PROBE LOCATION
- GP-6 ● SOIL PROBE LOCATION WITH TEMPORARY WELL



**SOIL PROBE\TEMPORARY WELL LOCATION DIAGRAM  
 BEER LINE "B" DEVELOPMENT  
 MILWAUKEE, WISCONSIN**

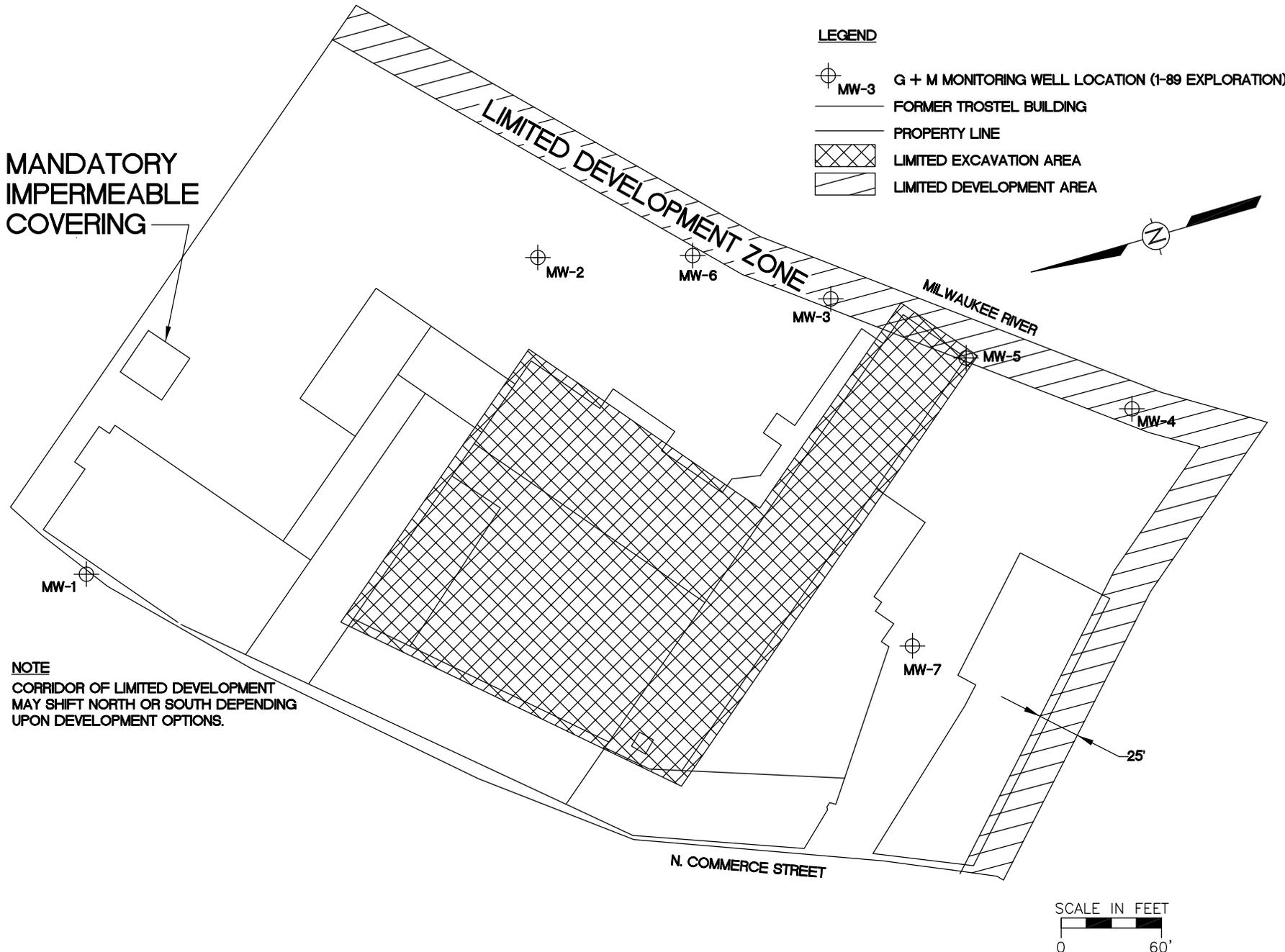


**LEGEND**

- GP-4 ● SOIL PROBE LOCATION
- GP-6 ● SOIL PROBE LOCATION WITH TEMPORARY WELL



**SOIL PROBE\TEMPORARY WELL LOCATION DIAGRAM  
 BEER LINE 'B' DEVELOPMENT  
 MILWAUKEE, WISCONSIN**



**LEGEND**

-  MW-3 G + M MONITORING WELL LOCATION (1-89 EXPLORATION)
-  FORMER TROSTEL BUILDING
-  PROPERTY LINE
-  LIMITED EXCAVATION AREA
-  LIMITED DEVELOPMENT AREA

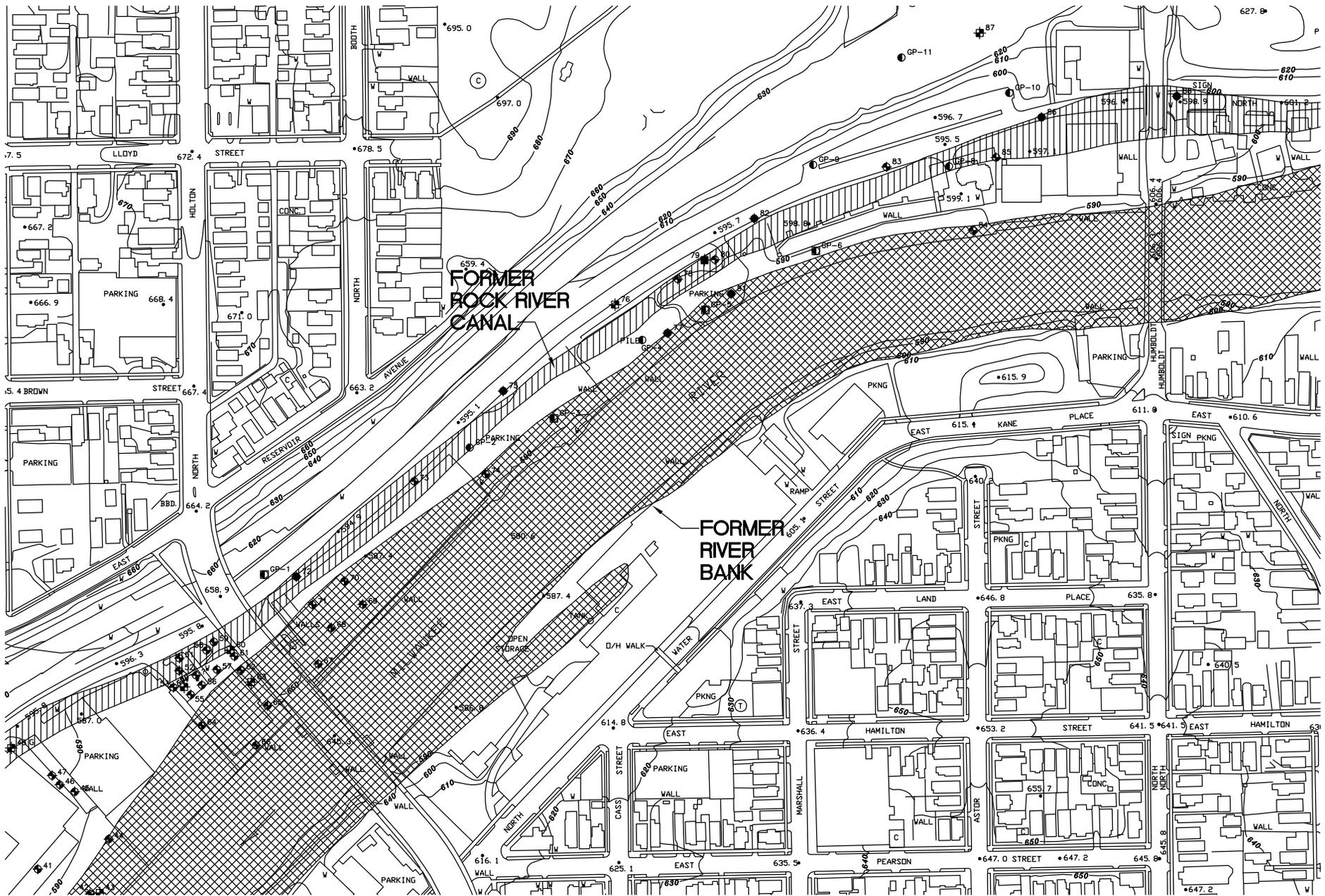
**MANDATORY IMPERMEABLE COVERING**

**NOTE**  
CORRIDOR OF LIMITED DEVELOPMENT  
MAY SHIFT NORTH OR SOUTH DEPENDING  
UPON DEVELOPMENT OPTIONS.

**SITE DEVELOPMENT RESTRICTIONS  
TROSTEL PROPERTY  
MILWAUKEE, WISCONSIN**







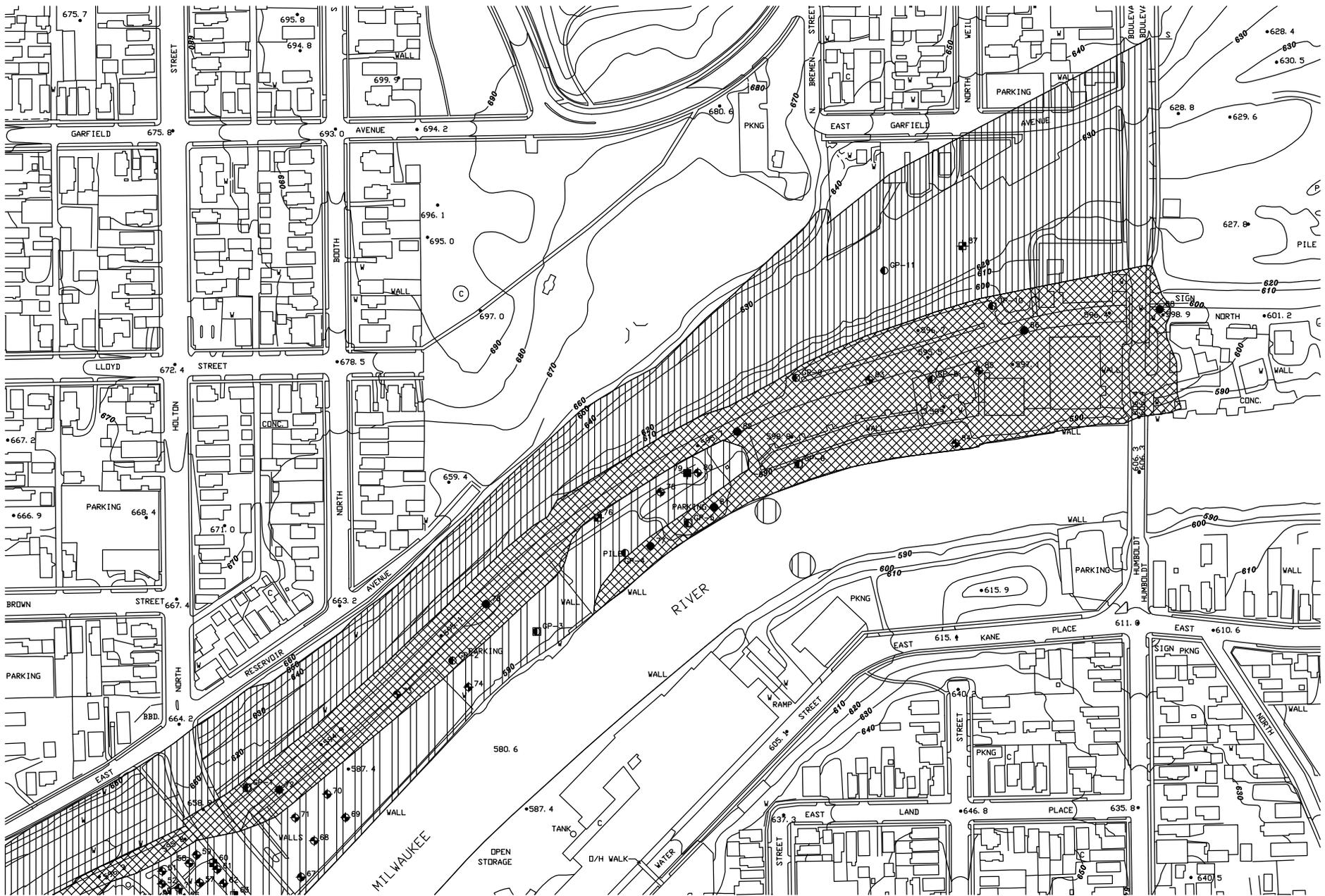
FORMER CANAL AND RIVER BANKS  
 BEER LINE "B" DEVELOPMENT  
 MILWAUKEE, WISCONSIN

SOURCE: "THE CENTRAL AREA OF THE CITY OF MILWAUKEE 1870"  
 CITY OF MILWAUKEE, CITY PLANNING DIV., 1958



85258  
 FIGURE 6.33



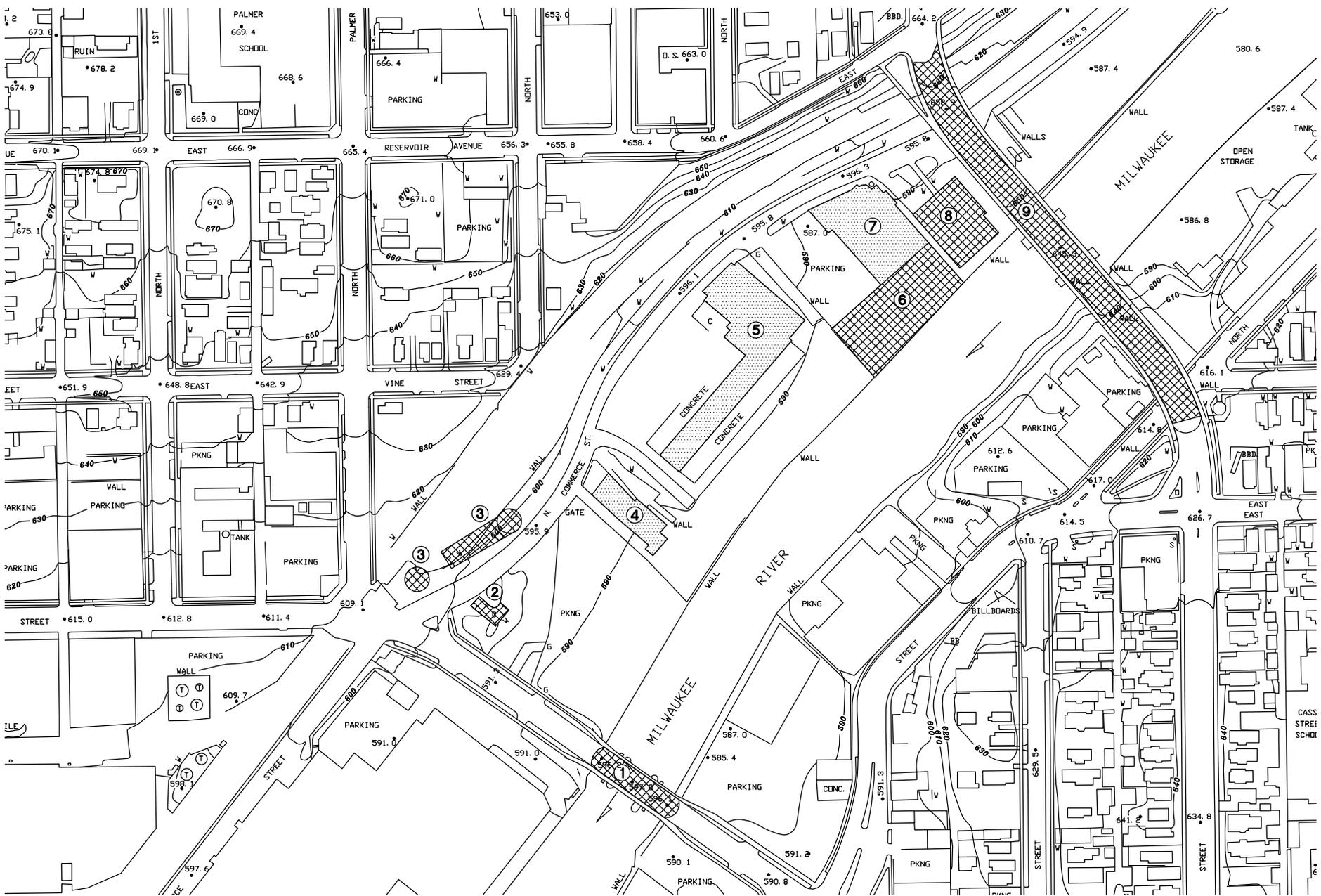


**SOIL CONDITION ZONES  
 BEER LINE "B" DEVELOPMENT  
 MILWAUKEE, WISCONSIN**

**LEGEND**

- ZONE A-LOOSE FILL OVERLYING ORGANIC SILT**
- ZONE B-LOOSE TO DENSE GRANULAR FILL AND SOFT TO HARD COHESIVE FILL OVERLYING ALLUVIAL SAND OR GLACIAL TILL**
- ZONE C-MOSTLY STIFF TO HARD COHESIVE FILL OVERLYING GLACIAL CLAY TILL**



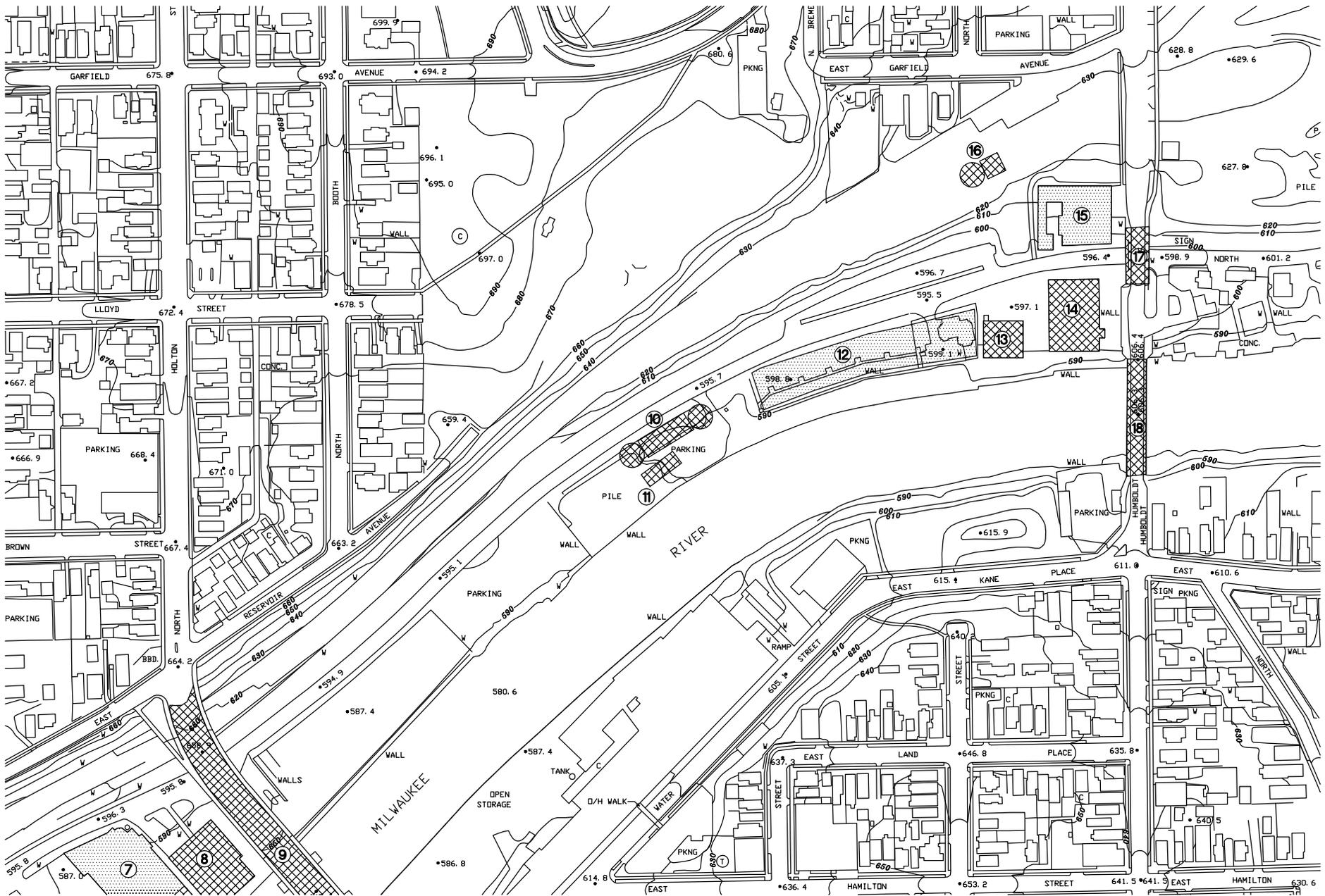


**LEGEND**

-  EXISTING STRUCTURES
-  FORMER STRUCTURES



**EXISTING AND FORMER STRUCTURE FOUNDATIONS  
 BEER LINE "B" DEVELOPMENT  
 MILWAUKEE, WISCONSIN**



**LEGEND**

-  EXISTING STRUCTURES
-  FORMER STRUCTURES



**EXISTING AND FORMER STRUCTURE FOUNDATIONS  
 BEER LINE "B" DEVELOPMENT  
 MILWAUKEE, WISCONSIN**