Exhibit-B: Specifications Volume 1, dated June 09, 2023

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1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:
1. Dagmara Larsen
2. 13278-5
3. Responsible for Divisions 01-49 Sections except where indicated as prepared by other design professionals of record.

B. Civil Engineer:
1. Sarah Church
2. E-39369
3. Responsible for DIV 31, DIV 33

C. Landscape Architect:
1. Ken Saiki
2. LA-76
3. Responsible for Division 10 14 53, 12 93 00, 32

D. Structural Engineer:
1. Abby Pertzborn
2. E-38746-6
3. Responsible for DIV 03-05

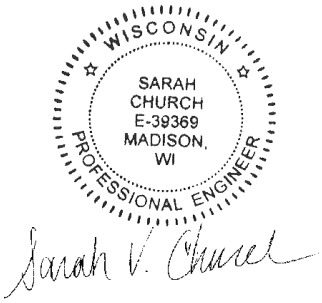
E. Fire-Protection Engineer:
1. Paul Hansen
2. E-41764-6
3. Responsible for DIV 21

F. Plumbing Engineer:
1. Tom Webber
2. 22866-006
3. Responsible for DIV 22

G. HVAC Engineer:
1. Tom Webber
2. 22866-006
3. Responsible for DIV 23

H. Electrical Engineer:
1. Darren Dickenson
2. E-36352
3. Responsible for DIV 26.

END OF SECTION



SECTION 00 31 32

GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.

B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.

C. Storm Management Report for the Project, prepared by Vierbicher Associates, Inc., dated June 04, 2021, is available for viewing as appended to this Document.

D. A geotechnical investigation report for Project, prepared by CGC, Inc., dated July 11, 2019, is available for viewing as appended to this Document.

E. The opinions expressed in these reports are those of a geotechnical and civil engineer and represent interpretations of storm and subsoil conditions, tests, and results of analyses conducted by an engineer. Owner is not responsible for interpretations or conclusions drawn from the data.

F. Any party using information described in these reports shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.

END OF DOCUMENT 00 31 32

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STORMWATER MANAGEMENT REPORT

Madison Public Market - 200 N. First Street

City of Madison, WI

Prepared For:
The City of Madison
210 Martin Luther King Jr Blvd #115
Middleton, WI 53703

Prepared By:
Vierbicher Associates, Inc.
999 Fourier Drive, Suite 201
Madison, Wisconsin 53717

Prepared On:
June 4, 2021

Project #180275

8595

vierbicher
planners | engineers | advisors

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NARRATIVE

1.1 Introduction

The project site is located at 200 N. First Street in Madison (SW ¼ & the SE ¼ of the SW ¼ of Section 6 Town 7N Range 10E). The existing site serves as a fleet vehicle service facility for the City of Madison. The proposed project for Madison Public Market will renovate the interior of the existing building and redevelop the parking lot to include stormwater management features. The existing lot is 3.56 acres but the project site limits are only 2.58 acres including a portion of the adjacent MMSD lot. A CSM and Quit Claim Deed will be prepared to consolidate the parcel boundary. The redevelopment of this site will add a net total of approximately 550 SF of impervious area (sidewalk and parking).

Existing drainage patterns will be maintained for this project. Currently, the majority of the site drains internally to storm sewer which discharges to City utilities in the right-of-way (First Street & Johnson Street). No stormwater management facilities are currently in place. There is approximately 1.15 acres of landscape, sidewalk, and pavement area from adjacent properties which drains through the site. This has been accounted for in grading, utility, and stormwater management calculations.

The site is not in a thermally sensitive area and there are no floodplains within the property. Wetland indicators are present on the site per DNR's Surface Water Data Viewer but the site has been cleared by the DNR following a desktop screening as part of this project. See section 9.3 for the DNR concurrence email.

The site is required to meet City of Madison and DNR requirements for redevelopment. These requirements include sediment control, peak runoff rate control, runoff volume control, and oil and grease control. These site requirements will be met with two lined bio-retention basins, an above ground cistern, and an underground stormwater detention system with isolator rows.

1.2 Soils Description

The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) online Web Soil Survey, indicates the proposed project site contains soils consisting of Coltwood silt loam (Co) with 0 to 2 percent slopes which fit into the Hydrologic Soil Group "C/D". CGC, Inc. completed a soils evaluation July 11, 2019 which is located in section 3.2 of this report. During the drilling of soil borings, groundwater was encountered 5-8.5' below grade.

The site has been operated as a fuel and maintenance facility since 1945. There are two fuel pump stations in the northwest corner of the site which will remain under this project. The on-site soils and groundwater contain residual contamination of petroleum VOC's. The WDNR closed case BRRTS activity # is 03-13-000438 and the case closure letter is located in section 3.3 of this report. The cap maintenance plan required by the DNR will be preserved in this project. Due to the historic use of the site, high groundwater, residual contamination, and cap maintenance requirements, the site is prohibited from infiltration.

1.3 Design Criteria

Stormwater Management Requirements		
Design Frequency	1, 2, 5, and 10-Year, 24-hour storm events using the MSE4 NRCS Rainfall Distribution	
Rainfall Data	2.49, 2.84, 3.49, and 4.09-inch/24-hour	
Curve Number	Ex. Conditions: Impervious: 98 Pervious: C - 74	Pro. Conditions: Impervious: 98 Pervious (on-site): D - 80 Pervious (off-site): C - 74 SWM Facility: 100
Sediment Control	60% Reduction for all new exposed parking areas, as compared to no controls	
Peak Rate Control	Reduce the peak rate by 15% compared to ex. conditions during a 10-year, 24-hour event	
Volume Control	Reduce volume by 5% compared to ex. conditions during a 10-year, 24-hour event	
Green Infrastructure	Reductions shall utilize green infrastructure which captures at least the first ½" of rain over the total site impervious area	
Oil and Grease Control	Treat first ½"	
Thermal Control	Not in a thermally sensitive area	

1.4 Summary of Results

Sediment Control

The site will be required to reduce TSS by sixty percent (60%) for all new parking areas as compared to no controls. The runoff from adjacent properties has been modeled such that the sediment loading has been removed but the volume has been accounted for. Hydrologic Soil Group C soils have been modeled as silty. Both the proposed bio-retention basins and the underground detention system have been modeled assuming no infiltration as liners will be installed per DNR standards. No sediment removal credit was assumed from the above-ground cistern. The table below summarizes the TSS modeling results. "New Parking Loading" is based on the post-developed exposed parking area within the project site. To calculate "With Controls Total", the post-developed site has been modeled with controls and with sediment loading removed from all source areas except parking.

New Parking Loading (lbs)	Required Reduction 60% of New Parking (lbs)	With Controls Total (lbs)	TSS Removed (lbs)	% Reduction
904	(0.6 * 904) = 542	365	(914 - 372)= 542	(542 / 904) = 60.0%

The site is required to meet 60% TSS reduction for all new exposed parking areas from a no control standpoint. The stormwater management facilities have been designed to treat runoff and will achieve a 60.0% TSS removal rate. TSS was modeled with WinSLAMM v. 10.4.1 and calculations are within section 4 of this report.

Peak Runoff Rate Control

The site must reduce the peak runoff rate by 15% compared to existing conditions for the 10-year, 24-hour event. The runoff from the site is routed through bio-retention basins and an underground detention system. Runoff from the existing roof will be routed through an above-ground cistern. The peak runoff rate control calculations are in section 5 of this report. Pervious surfaces curve numbers have been lowered one hydrologic soil group rating between existing and proposed conditions. The table below summarizes the peak runoff rate control calculations for the redevelopment.

Ex. Site Runoff (2.6 Ac) (CFS)	Reduction Requirement (CFS)	Ex. Conditions (4.1 Ac) (CFS)	No Controls (4.1 Ac) (CFS)	Pro. Conditions (4.1 Ac) (CFS)	Reduction (Ex. – Pro.) (CFS)
12.40	*(15%)(12.40) = 1.86*	*18.43*	*19.41*	*10.84*	*18.43 – 10.84 = 7.59*

Volume Control

Redevelopment sites are required to reduce runoff volume by 5% compared to existing conditions during a 10-year, 24-hour event. To determine reduction requirements, both the existing and proposed conditions are analyzed within the project limits only. The reduction shall be completed using green infrastructure that captures as least the first ½" of runoff. Although the project will contain two bioretention basins (green infrastructure), infiltration is prohibited so this requirement will be met with the proposed 18,500 gallon cistern. Runoff captured in the cistern will be reused within the building. City staff has confirmed the cistern may be assumed to be empty at the start of each design storm. The table below summarizes the results of volume control modeling of the 10-year, 24-hour event.

Ex. Conditions Runoff Volume (2.6 acres) (CF)	Pro. Conditions Runoff Volume (2.6 acres) (CF)	Cistern Captured Runoff (CF)	Net Runoff Reduction (CF)	% Reduction
32,016	*32,801*	*2,473*	*1,688*	*5.3 %*

The proposed cistern qualifies as "green infrastructure" and will reduce the site's runoff volume by 5.3% for the 10-year, 24 hour storm event compared to existing conditions. Runoff volumes were modeled with HydroCAD 10.00-14 and calculations are within section 6 of this report.

Green Infrastructure

The required rate and volume reductions shall be completed using green infrastructure that captures at least the first ½" of rainfall over the total site impervious area. This requirement will be met with the proposed bio-retention basins and above-ground cistern. To determine capture requirement, the proposed conditions are analyzed within the project limits only. The table below summarizes the rainfall capture of green infrastructure during a ½" storm.

Pro. Conditions Impervious Runoff (2.6 acres) (CF)	Bio-retention Storage Available (CF)	Cistern Storage Available (CF)	Total Green Infrastructure Storage Available (CF)	% of Requirement Met
2,439	1,861 + 1,393	2,473	5,727	235%

The proposed green infrastructure improvements will provide enough storage capacity to capture at least the first ½" of rainfall over the total site impervious area. Runoff volumes were modeled with HydroCAD 10.00-14 and calculations are within section 7 of this report.

Oil and Grease

Oil and Grease is handled with the bio-retention basins and permanent storm inlet filters.

Thermal Control

Site is not in a thermally sensitive watershed.

Erosion Control

The project is anticipated to begin November, 2021 and will be restored by November, 2022. All erosion control measures will be in place prior to land disturbing activities. Erosion control measures consist of gravel tracking pad, silt fence, and inlet filters. A detailed construction sequence is located in the construction plans in section 8 of this report.

1.5 Conclusions

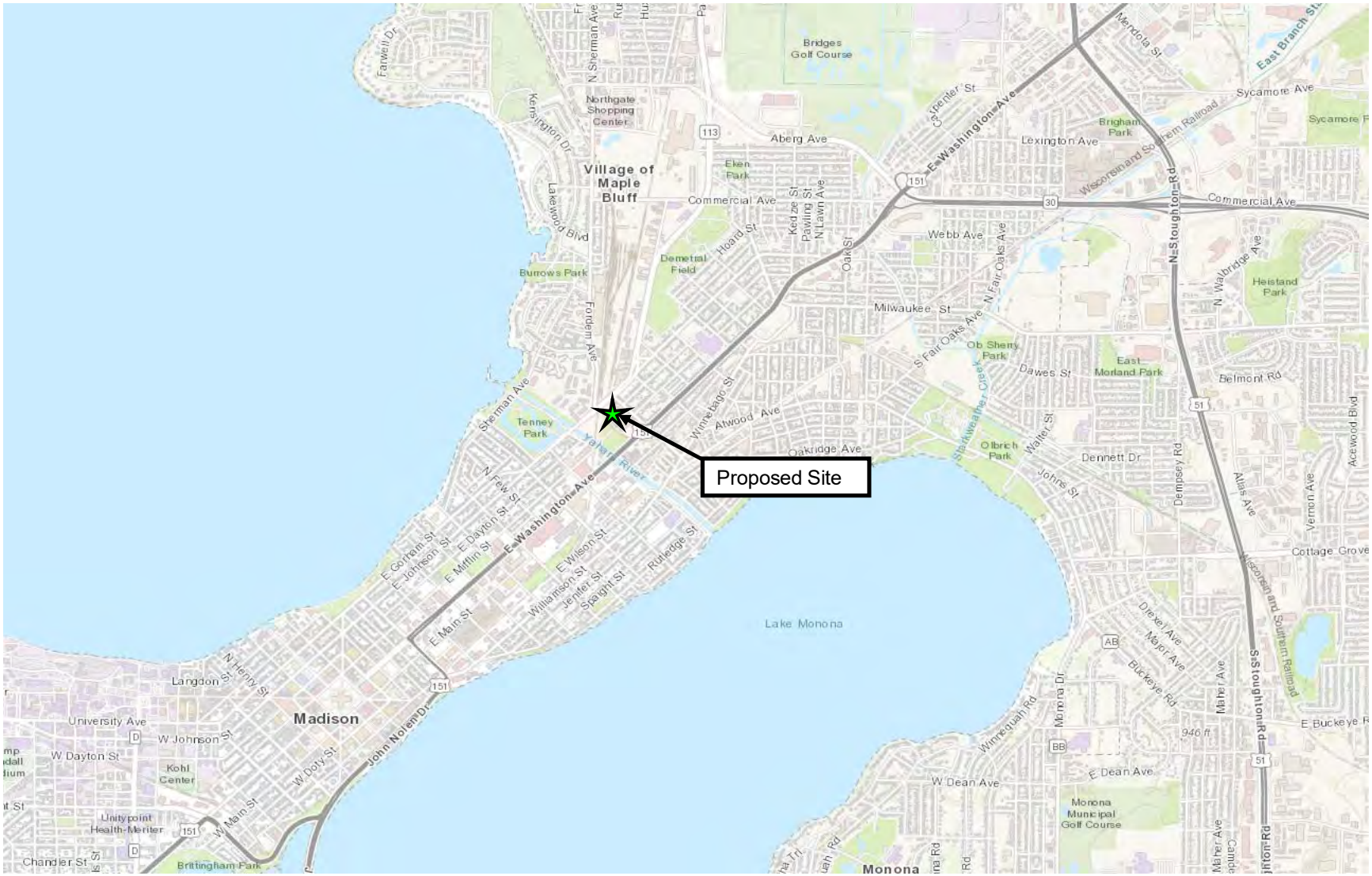
The stormwater management facilities and erosion control measures have been designed to exceed the City of Madison and DNR requirements for redevelopment. The site will meet the stormwater management requirements with the construction of two lined bio-retention basins, an underground detention facility, and an above-ground cistern. There will be erosion control measures constructed prior to land disturbance which will remain in place until the site is stabilized.

1.6 Permits

The following is a list of anticipated stormwater management or erosion control reviews/permits that have been or will be applied for:

- City of Madison Stormwater Management Permit
- City of Madison Erosion Control Permit
- City of Madison Exterior Plumbing Permit
- Department of Natural Resources Stormwater Notice of Intent (NOI)

2.1 Location Map



Source: Dane County GIS (DCiMap)

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Map 2.1: Location Map
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

2.2 Aerial Map

Source: Dane County GIS (DCiMap)

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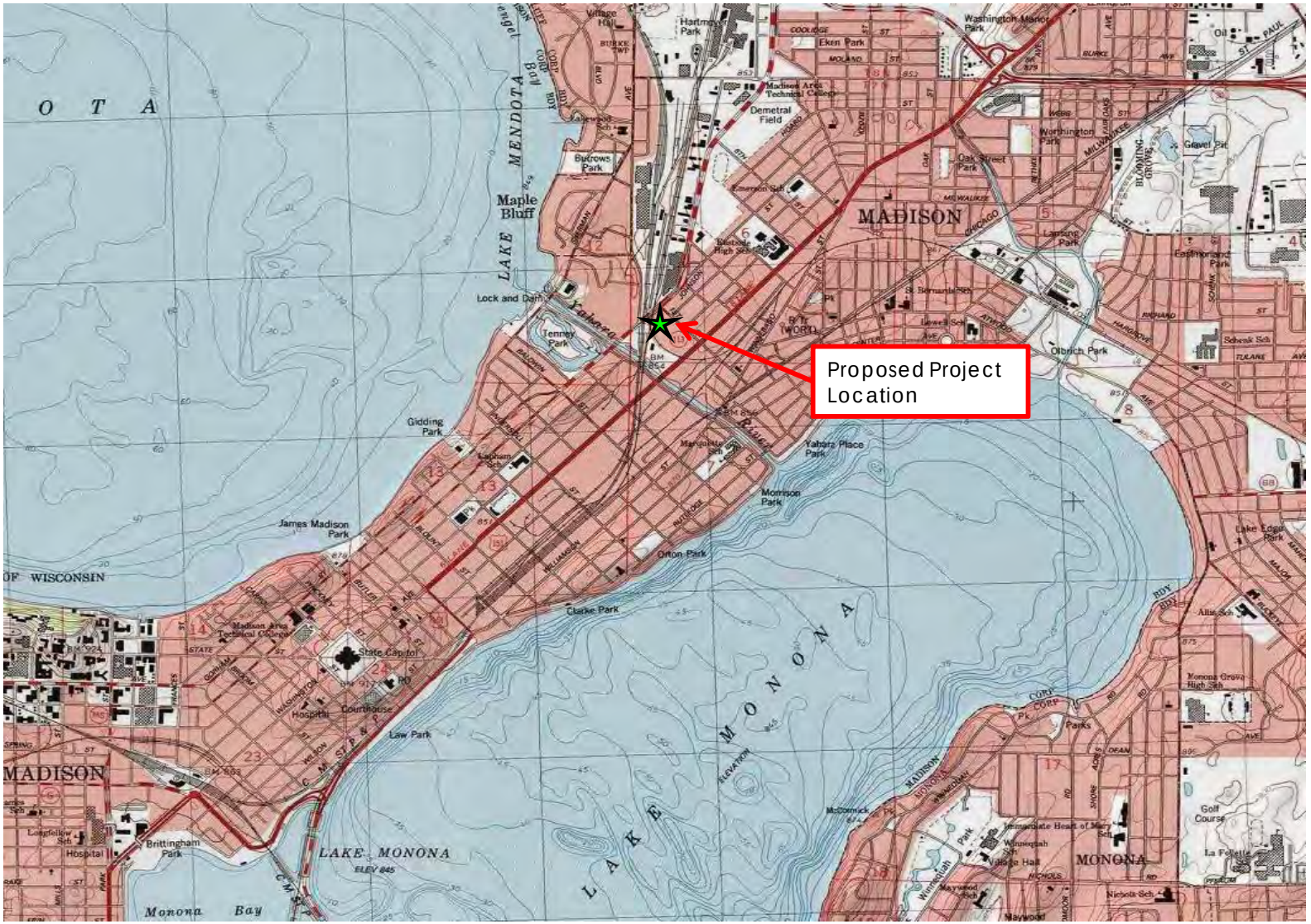
Map 2.2: Aerial Map
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

2.3 USGS Quad Map



Source: https://viewer.nationalmap.gov/advanced-viewer/ (2013 National Geographic Society)

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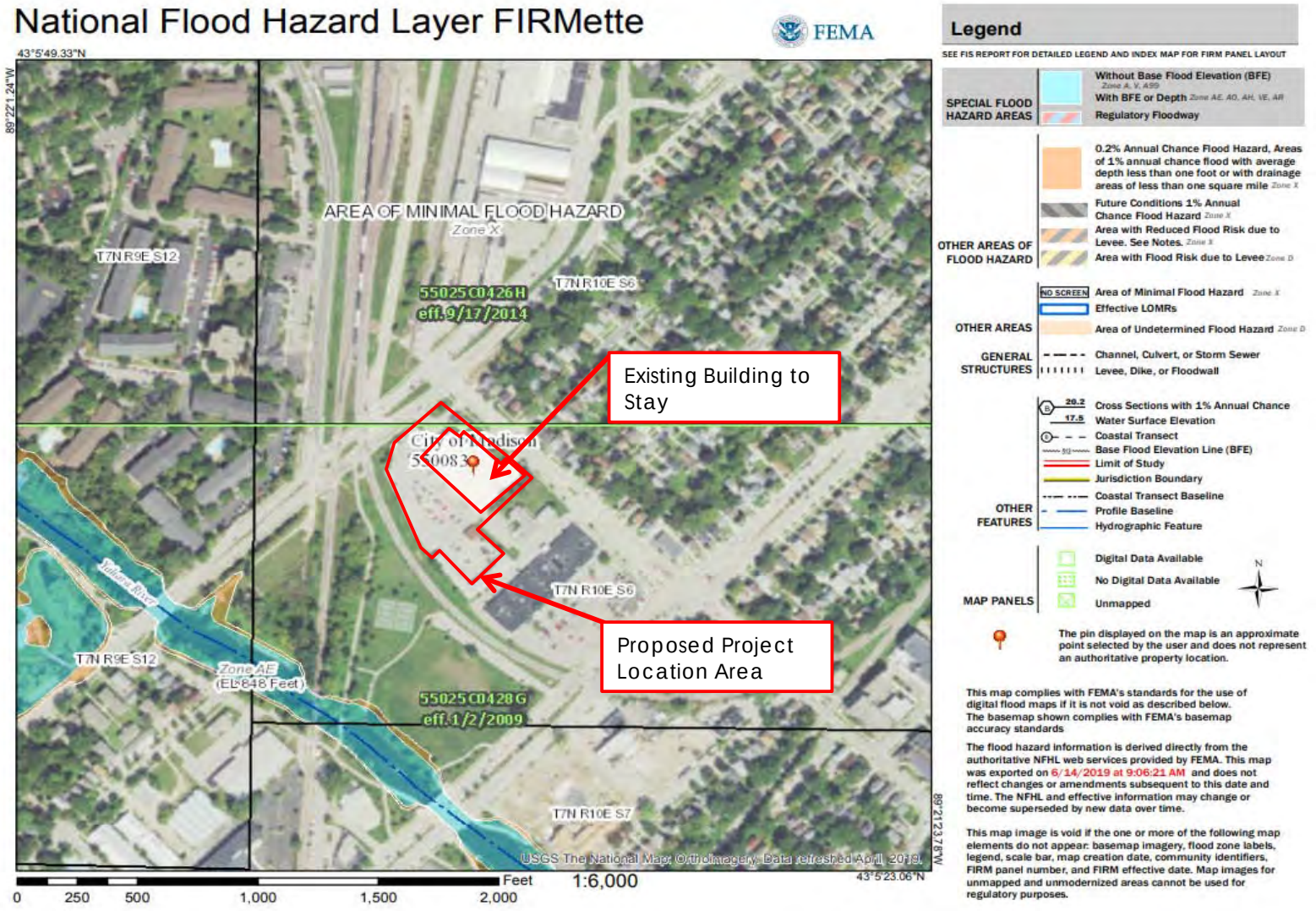
Map 2.3: Site Location on USGS Quadrangle Map
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

2.4 FEMA Map



Source: FEMA Flood Map

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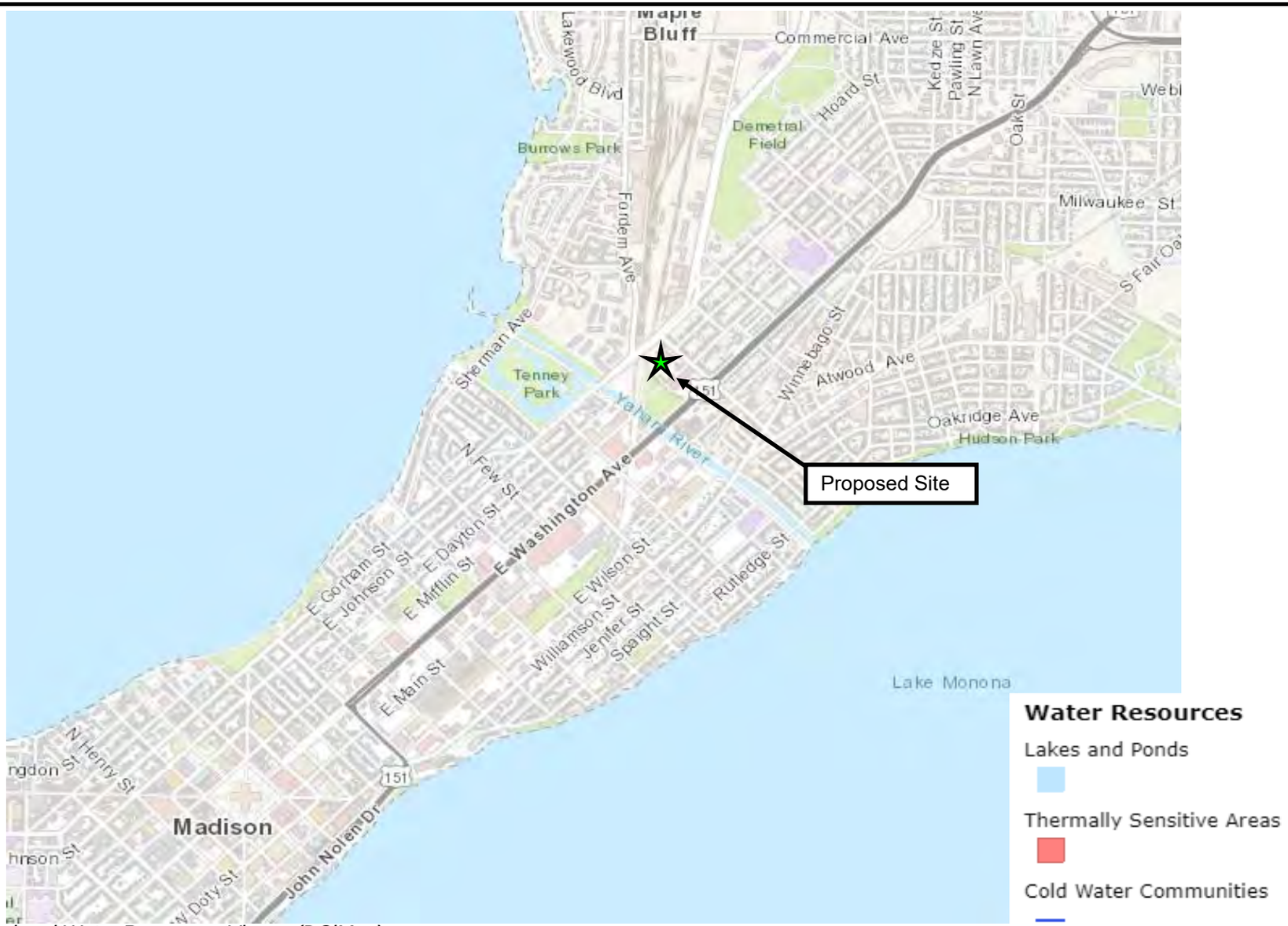
Map 2.4: FEMA Flood Map
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

2.5 Thermal Location Map



Source: Land and Water Resources Viewer (DCiMap)

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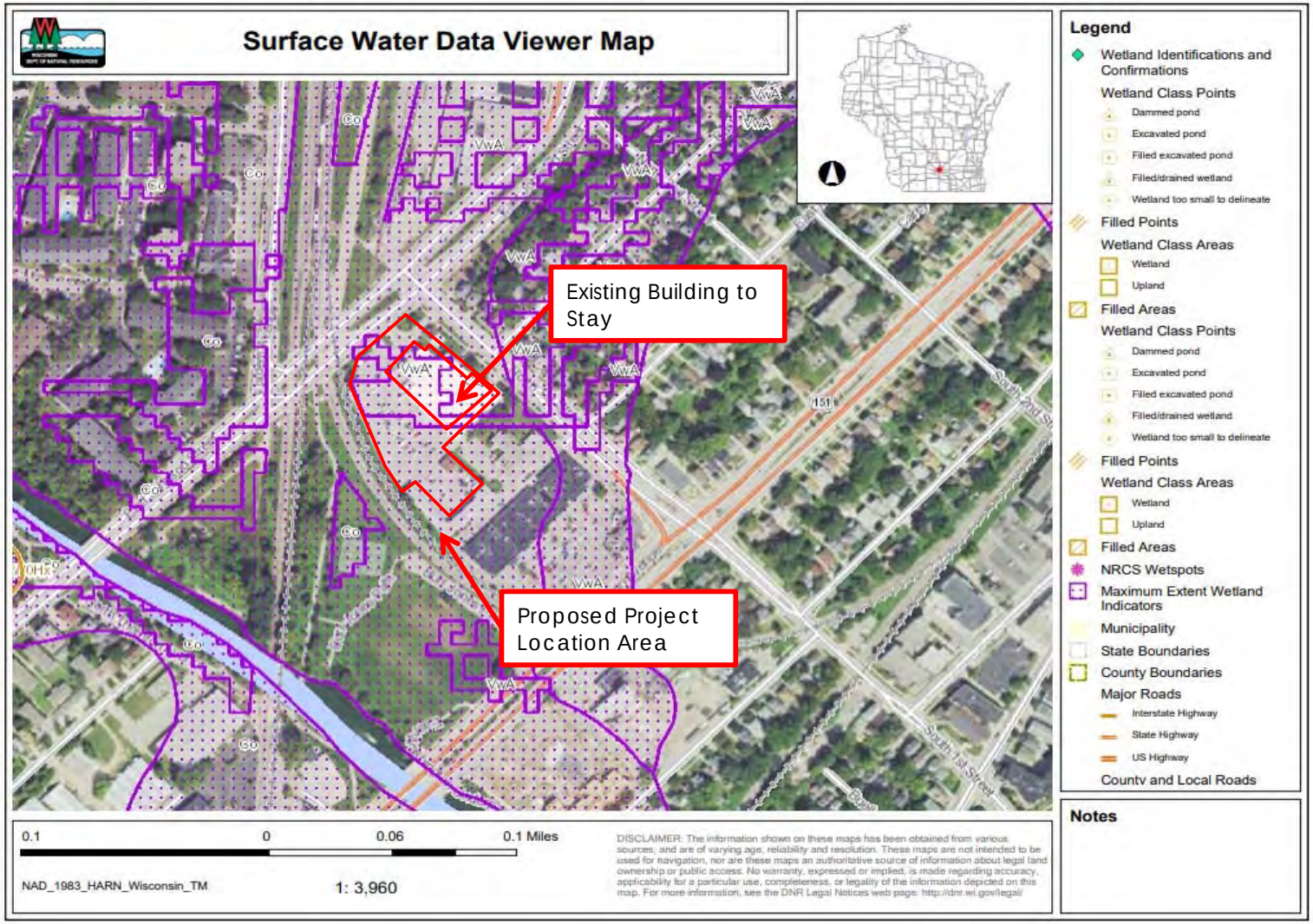
Map 2.5: Thermal Indicator Map
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

2.6 Wetland Indicators Map



Source: Wisconsin DNR Surface Water Data Viewer Map

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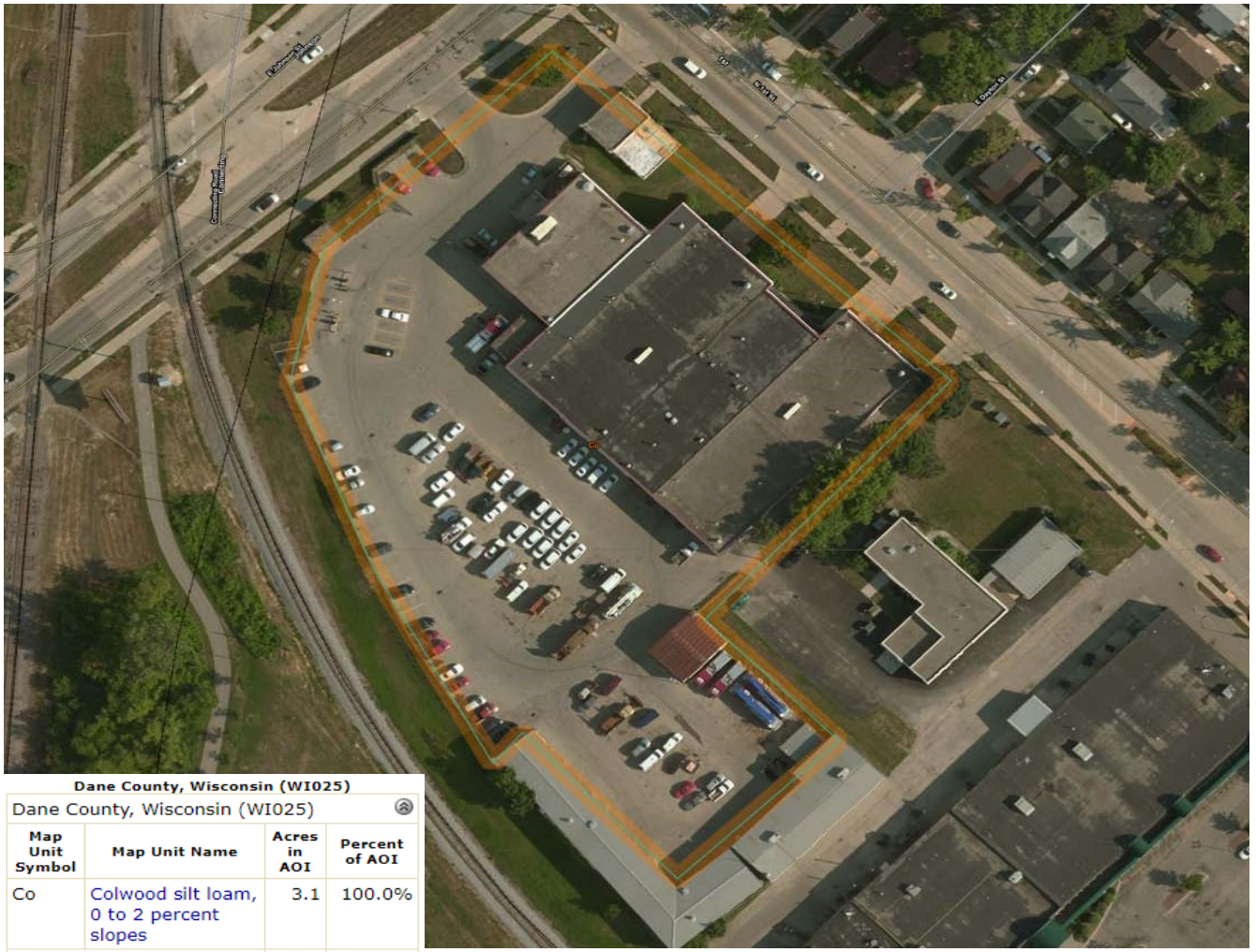
Map 2.6: Wetland Indicators Map
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

3.1 County Soils Map



Dane County, Wisconsin (WI025)

Dane County, Wisconsin (WI025)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Co	Colwood silt loam, 0 to 2 percent slopes	3.1	100.0%
Totals for Area of Interest		**3.1**	**100.0%**

Source: NRCS Web Soil Survey

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Map 3.1: NRCS Soil Map
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

3.2 Soil Report

CGC, Inc.
Construction • Geotechnical
Consulting Engineering/Testing

July 11, 2019
C19051-10

Mr. Brent Pauba
Department of Public Works – Engineering Division
City County Building, Room 115
210 Martin Luther King, Jr. Blvd.
Madison WI 53703-3342

Re: Geotechnical Exploration Report
Proposed Redevelopment
200 North First Street
City of Madison, Dane County, Wisconsin

Dear Mr. Pauba:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the subsurface exploration program for the above-referenced project. The purpose of this program was to evaluate the subsurface conditions within the proposed construction area and to provide geotechnical recommendations regarding site preparation, foundation, floor slab, below-grade wall and pavement design/construction. A determination of the site class for seismic design and a preliminary discussion of the stormwater infiltration potential are also included. We are sending you an electronic copy of this report, and we can provide a paper copy upon request.

SITE AND PROJECT DESCRIPTION

We understand the City of Madison Fleet Services site at 200 North First Street is planned to be redeveloped. While the existing garage is envisioned to house the future public market, which will require some remodeling, we understand that outdoor market spaces, landscaping features, stormwater management areas and a parking lot are planned to be added in the surrounding areas. The existing buildings in southern parts of the site are proposed to be preserved.

Based on a provided topographic site plan (Burse Surveying & Engineering; 1-ft contour lines), site grades surrounding the existing buildings are fairly flat, with current ground surface elevations ranging between about EL 851 and 853 ft. The majority of the site is paved with asphalt and used for vehicle parking. Gas pumps exist in northwestern portions of the site.

We understand improvements to the existing garage/future public market building are envisioned to include an elevator and recessed pit for a loading dock lift. The elevator pit is proposed to be about 4.0 ft deep. We understand the footings of the existing building extend approximately 13.5 ft below the ground surface and were designed for an allowable bearing pressure of 4,000 psf. Canopies are to be added adjacent to the building on the southwest, northwest and northeast sides, and we understand canopy footing grades are envisioned to match footing grades of the existing building. In

2921 Perry Street, Madison WI 53713
Telephone: 608/288-4100
FAX: 608/288-7887

addition, an 80- to 120-ft tall landmark steel structure is proposed near the planned main entrance on the northwest side of the building. Besides these improvements, the redevelopment of the side is planned to involve a reconfiguration of the pavement areas to facilitate truck access as well as car and bike parking, and a raised patio is also planned on the northeast side of the building.

SUBSURFACE CONDITIONS

Subsurface conditions for this study were explored by drilling 14 Standard Penetration Test (SPT) soil borings to planned depths between 10 and 75 ft below current site grades at locations selected by the planning team and located in the field by CGC in conjunction with City personnel. The borings were conducted by Badger State Drilling (under subcontract to CGC) on June 10 through 12 and 17, 2019 using a truck-mounted CME-55 and a track-mounted D-50 rotary drill rig equipped with hollow stem augers, mud rotary tooling and automatic SPT hammers. Note that auger and split-spoon refusal occurred in Borings 9 and 11, which were planned to be extended to 75 ft, at depths of about 63.5 ft on apparent sandstone bedrock and about 53 ft on a cobble/boulder or bedrock, respectively. During drilling, soil samples from certain borings located near known contaminated areas were screened for potential environmental contamination by a City of Madison hydrogeologist. (Specific results of the field screening are not included in this report.) The specific procedures used for drilling and sampling are described in Appendix A, and the boring locations are shown in plan on the Soil Boring Location Exhibit presented in Appendix B. Ground surface elevations at the boring locations were estimated by CGC based on the provided topographic site plan (Burse Surveying & Engineering; 1-ft contour lines), and elevations should therefore be considered approximate.

The subsurface profiles at the boring locations were fairly consistent, and the following strata were typically encountered (in descending order):

- About 4 to 10 in. of ***asphalt pavement*** over about 4 to 10 in. of ***base course***; or
- About 4 to 8 in. of ***topsoil fill***; followed by
- About 1 to 6.5 ft of ***variable fill*** soils, containing miscellaneous debris/rubble and/or organics in some location; over
- About 1.5 to 4.5 ft of very loose to loose ***sedimentary to fibrous peat and organic soils***, as well as isolated medium stiff to stiff clay layers; underlain by
- About 2 to 15.5 ft of very loose to medium dense ***sand strata*** *(possible sandy marl)*, generally containing fairly low amounts of silt and gravel, with occasional peat/organic seams and pockets and shells; over
- About 8+ to 40+ ft of ***cohesive and fine-grained soils***, including medium stiff to very stiff lean to silty clay and medium dense to dense clayey silt, silt and sandy silt soils, interspersed with occasional sand seams/layers; followed by
- About 10 ft of ***sand soils*** with variable silt and gravel contents, as well as scattered cobbles/boulders (apparent glacial till in lower portions), in Boring 9; and

- ***Very dense probable weathered sandstone bedrock*** to the level of auger and split-spoon refusal in Boring 9.

As noted above, some of the existing fill soils were intermixed with debris, such as concrete, ceramic and glass fragments, as well as possible cinders and possible coal residue, or comprised of possible foundry sand, and also included coarser concrete and/or asphalt rubble in some locations. In addition, possible petroleum/chemical odors were noted in samples from the existing fill and/or some of the natural soils underlying the fill in Borings 2, 3, 5, 8 and 11. Fill soils containing cinders and other debris, as well as natural soils containing odors may be environmentally impacted and could potentially require landfill disposal if excavated and removed from the site. We recommend further guidance regarding these issues be provided by the City's hydrogeologist or an environmental consultant.

The existing fill was generally underlain by peat and organic soils. Natural moisture contents determined on representative samples obtained from these strata ranged from 24.2% to 173.5%. In addition to natural moisture contents, a few of these samples were analyzed for their organic contents by means of loss-on-ignition (LOI). The tested specimens had organic contents between 8.3% and 38.2%, with soils having organic contents between 4% and 12% being considered organic, and soils with organic contents greater than 12% considered to be peat (fibrous peat above 50%). The organic soil and peat layers (and, to a slightly lesser extent, sandy marl soils containing peat seams) are moderately to highly compressible in the short term, and are subject to decomposition causing further (secondary) settlement in the long term.

Furthermore, representative sand samples obtained from Borings 7 and 13 were analyzed with regard to their particle size distribution (gradation). The samples were determined to have P200 ("fines") contents of 4.1% and 14.8%, corresponding to USCS classifications of poorly graded sand (SP) to silty sand (SM) and USDA classification of fine sand (FS), respectively.

Natural moisture contents were also determined on samples obtained from the deeper clay layers encountered in Borings 3, 4, 8, 9 and 11, as well as the shallow *possible fill* clay soils encountered in Boring 5. The clay samples were found to have natural moisture contents between 18.2% and 25.3%. Atterberg limits determined on a few clay samples showed liquid and plastic limits of 25% to 30% and 14% to 16%, respectively. Based on natural moisture contents, Atterberg limits, pocket penetrometer readings (q_p; an estimate of the unconfined compressive strength of cohesive soils) and SPT blow counts (N-values), the on-site clays should generally be considered slightly compressible.

As mentioned above, auger and split-spoon refusal occurred in Borings 9 and 11, which were planned to be extended to 75 ft, at depths of about 63.5 ft on apparent sandstone bedrock and about 53 ft on a cobble/boulder or bedrock, respectively. Apparent bedrock (or auger/split-spoon refusal) was not encountered in the other borings performed on this site.

Groundwater was encountered in the borings during drilling at depths between about 5.5 and 8.5 ft, corresponding to approximately EL 842.5 to 846.5 ft. In Boring 2, apparent perched water was encountered at about 3.0 ft below the ground surface during drilling (corresponding to approximately EL 848.0 ft). About 20 to 30 minutes after the completion of drilling, groundwater levels in the boreholes were read at depths of about 5.0 to 8.0 ft below current site grades, corresponding to approximately EL 843.7 to 846.6 ft. Note, however, that some of the on-site soils are fairly fine-grained (typically associated with a fairly low hydraulic conductivity), which may delay infiltration of groundwater into the boreholes. Groundwater readings during the fairly short period of drilling (and shortly thereafter) should therefore be considered approximate.

The site is located about 2,200 ft southeast of Lake Mendota and 3,500 ft northwest of Lake Monona, as well as about 700 ft northeast of the Yahara River connecting the two lakes. Therefore, groundwater levels on the site are generally expected to be between the water levels in the two lakes. For reference, during the time of our subsurface investigation from June 10 to 17, 2019, the water levels in Lakes Mendota and Monona were recorded at about EL 850.3 and 845.9 ft, respectively, according to the Dane County Land & Water Resources Department *Lake Levels & Information* online platform. Typical water levels in Lakes Mendota and Monona are EL 850.1 and 845.2 ft (typical summer maximum), and 100-year water level are set at EL 852.8 and 847.7 ft, respectively, Note, however, that Lake Monona experienced unusually high water levels due to heavy rainfalls and subsequent flooding in August and September of 2018, with the maximum lake level recorded at EL 848.52 ft on September 6, 2018 (exceeding the 100-year level by about 0.8 ft). Lake Mendota reached a maximum water level of EL 852.30 ft on August 23, 2018, which did not exceed the 100-year level.

In order to obtain longer-term groundwater data, a temporary groundwater monitoring well was installed in the borehole of Boring 13. Water level observations in the well, the soil borings and lake levels are summarized in the following Table 1:

TABLE 1 – Summary of Water Levels

Date	June 10, 2019	June 11, 2019	June 12, 2019	June 17, 2019	July 3, 2019
Lake Mendota	850.4	850.4	850.3	850.3	850.7
B-13/MW	N/A	844.0± (1)	N/A	N/A	846.0±
Average in Borings	846.2± (2)	844.7± (3)	845.4± (4)	844.8± (5)	N/A
Lake Monona	845.9	845.9	845.9	845.9	846.4

Notes: (1) Approximate groundwater level in Boring 13 during drilling.
(2) Average groundwater level in Borings 1, 2 and 6 about 20 minutes after completion of drilling.

(3) Average groundwater level in Borings 3, 5, 7 and 8 about 20 to 30 minutes after completion of drilling.
(4) Average groundwater level in Borings 4, 10 and 12 about 20 minutes after completion of drilling.
(5) Approximate groundwater level in Boring 14 about 30 minutes after completion of drilling.

Based on the available groundwater data summarized in Table 1, groundwater levels on this site generally appear to be closer to water levels in Lake Monona. In addition to the influence from the water levels in Lakes Mendota and Monona (and Yahara River), groundwater levels are expected to fluctuate with pumping rates in nearby wells and seasonal variations in precipitation, infiltration, evapotranspiration, as well as other factors. A more detailed description of the site soil and groundwater conditions is presented on the soil boring logs attached in Appendix B, which also contain the laboratory test results including Particle Size Distribution Test Reports.

DISCUSSION AND RECOMMENDATIONS

1. Overview

In our opinion, the lower-strength shallow subsurface conditions, including variable fill, peat/organic soils and loose sand/marl, are not favorable for the support of conventional shallow spread footing foundations. The fairly shallow groundwater table on this site is anticipated to further complicate construction. Our recommendations, further elaborated in the subsequent sections of this report, can be outlined as follows:

- We understand the new canopy footings are planned to be extended about 13.5 ft below current site grades to match footing grades of the existing building. At that depth, natural soils suitable to support footings designed for a moderate allowable bearing pressure should generally be encountered, with the understanding that undercutting of looser sands could potentially be required below the bottom of footings in isolated areas. However, footing excavations to match existing footing grades (as well as potential undercutting) are expected to require a significant dewatering effort during construction in order to develop firm and stable foundation subgrades. In addition, underpinning of existing footings could be required if unsuitable soils will need to be undercut below existing foundation grades.

- In order to somewhat reduce the dewatering effort and excavation volume, it is our opinion that canopy footings further away from the existing building could potentially be supported at shallower depths if a lower allowable bearing pressure is used for foundation design. One option would be to undercut the existing fill and

peat to expose the natural sands and support the canopy footings at frost depth on engineered backfill. Alternatively, the footings, designed for a fairly low allowable bearing pressure, could be supported directly on the top of the native sand/marl layers, about 5 to 10 ft below current site grades.

- A third option for canopy support would be a deep foundation system, such as helical piers. The advantage with using helical piers (or other deep foundations) would be to practically eliminate the need for undercutting below pile caps/grade beams (bottom at frost depth at least 4 ft below finish site grades), and significantly reduce the need for dewatering during construction.

- The potential landfill disposal costs of impacted soils should also be considered when deciding on the foundation alternative. The additional disposal costs from deep undercutting/replacement may render a deep foundation alternative more favorable.

- As noted above, temporary dewatering during construction is generally expected, which could be fairly significant if conventional spread footings at existing footing grades or intermediate depths should be pursued. Environmentally impacted water (dewatering system effluent) may have special treatment or disposal requirements.

- Based on Boring 14, we expect the 4-ft deep elevator pit base slab to be supported on existing fill over possible fill clay and native sand soils, and we assume similar conditions for the loading dock lift pit. Compared to fill soils encountered in other portions of the site, the fill soils below the existing building appear to have been placed in a somewhat engineered manner, and the peat layer appears to have been removed prior to fill placement within the building pad. Provided the organic soils have been removed and the contact pressure at the bottom of the elevator pit base slab and loading dock lift pit base slab is fairly low, the elevator pit and loading dock lift pit can potentially be supported on the existing fill if found to be stable during construction. If the existing fill soils are found to be unsuitable for base slab support at the time of construction, or peat/organic soils are encountered at or slightly below base slab grades, we recommend the elevator pit and loading dock lift pit be supported on helical piers, as undercutting of unsuitable soils will likely be extremely difficult within the existing building.

- We recommend the raised patio which is planned near the north building corner either be supported on columns, with footings similar to the canopies or helical pier support. If the patio will be supported on structural fill placed to raise grades instead, we recommend that the marginal to lower-strength existing fill and highly-compressible peat soils be undercut prior to new fill placement, as we expect that

new fill placement with the peat remaining in-place would result in significant settlement. Alternatively, surcharging the patio area could also be considered.

- New pavement construction on this site will likely require widespread subgrade improvement, such as an additional layer of stone over a reinforcing geogrid below the new pavement base course.

- Based on the borings, it is our *preliminary* opinion that the site is not suitable to infiltrate significant amounts of stormwater due to the presence of variable fill and lower-permeability peat and the fairly shallow groundwater table.

Subject to the limitations discussed below, our recommendations for site preparation, foundation, floor slab, below-grade wall and pavement design/construction, along with our assessment of the site class for seismic design and a preliminary discussion of the stormwater infiltration potential, are presented in the following subsections. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

2. Site Preparation

We recommend that the existing pavement and base course be removed to evaluate the underlying subgrade soils with regard to new pavement support. Consideration could be given to milling the existing asphalt for reuse as fill. Existing topsoil should also be stripped at least 10 ft beyond the proposed construction areas, and trees and root zones should be removed from construction areas prior to or in conjunction with topsoil stripping. The topsoil can be stockpiled on-site and later re-used as fill in landscaped areas. Topsoil was about 4 to 8 in. thick in Borings 1, 4 and 9, but variable topsoil thicknesses should be expected between and beyond boring locations due to previous grading activities.

After pavement removal and topsoil stripping, exposed soils are generally expected to consist of existing variable fill soils. In areas remaining at-grade or requiring additional fill, we recommend the exposed granular soils be thoroughly recompacted with a vibratory smooth-drum roller. Zones that remain loose after recompaction should be undercut and replaced with granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) in accordance with our Recommended Compacted Fill Specifications presented in Appendix D. Alternatively, 3-in. dense graded base (DGB) that is placed in loose 10-in. lifts and compacted until deflection ceases can also be used to restore grades in undercut areas. Note that cohesive and fine-grained subgrades should be statically recompacted (i.e., without vibration) and subsequently proof-rolled with a piece of heavy rubber-tire construction equipment, such as a loaded tri-axle dump truck, to check for soft/yielding areas. If soft/yielding areas are observed, these soils should be undercut and replaced or stabilized as described above. Areas subsequently receiving fill should be checked for their pavement suitability prior to fill placement. Where existing below-grade structures have been removed, such as the fuel tanks in northwestern portions of the site, we recommend the exposed

subgrades be evaluated for their pavement support suitability, prior to recompaction and placing backfill as described above.

Note that due to the presence of potentially impacted soils at the site, we recommend that excavated soils either be kept on-site and appropriately capped (if impacted soils are determined to be within regulatory limits for this approach) or screened for environmental contaminants before being hauled off site. A materials management plan should be developed, and impacted soils removed from the site should be properly disposed of in a licensed landfill. We recommend that the City's hydrogeologist or an environmental consultant provide guidance on the need for special handling and disposal of impacted soils, as well as other environmental-related questions.

Fill placement to establish site and pavement grades, where required, can then proceed. To the extent possible, we recommend using granular soils (i.e., sands/gravels, including natural inorganic sand soils excavated on-site) as structural fill within pavement areas because these soils are relatively easy to place and compact in most weather conditions compared to clay/silt soils. To the extent possible, clay and silt soils excavated on-site are generally not recommended as structural fill because moisture conditioning by discing and drying (aeration) will likely be required to achieve desired compaction levels, which is highly weather-dependent (i.e., dry, warm and windy conditions) and could delay construction progress. In our opinion, clay/silt soils are best used as fill in landscaping or potentially as lower lifts in pavement areas provided the moisture contents can be sufficiently lowered from the natural states to facilitate compaction efforts. We recommend that structural fill be compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) following Appendix D guidelines. Periodic field density tests should be taken by CGC staff within the fill to document the adequacy of compactive effort. *Note however, that we do not recommend raising grades more than about 0.5 ft above existing site grades, unless the peat layers that were typically encountered below the existing fill are first undercut.* The increase in stress within the peat from additional fill above current site grades would likely result in significant settlement. One potential way of raising grades above existing site grades with the peat remaining in-place would be to surcharge the area, but this approach would require a time delay between placing the surcharge pile and beginning construction on the order of several months to a year or more. We can provide additional information and recommendations regarding surcharging, if requested.

We understand that the current plan is to support the canopies on conventional spread footings, with footing grades matching the footing grades of the existing building at about 13.5 ft below current site grades. Alternatively, it is our opinion that shallower footings a sufficient distance away from the existing building can likely be realized provided the existing fill and organic soils/peat layers are undercut below the bottom of footings. Excavation sidewalls should be braced or sloped back according to OSHA requirements. We anticipate that excavation slopes will be controlled by variable fill, softer clays, peat and very loose to loose sands, typically classified as OSHA "Type C" soils, with slopes of 1.5H:1.0V or flatter expected to be at least temporarily stable. Note that flatter side slopes will likely be required where perched or seeping water is present that destabilizes the side

slopes. *The appropriate excavation side slopes should be determined by a competent person completing the earthwork in accordance with OSHA slope guidelines.* Where adequate sloping is not possible, temporary earth retention will be required. Earth retention systems should be designed by a qualified professional engineer. Care should be exercised not to undermine the existing building foundations (e.g., if undercutting will be required extending below existing footing grades), and underpinning of existing footings could potentially be required, which should be evaluated by the contractor.

It is important to note that footing and undercut excavations will likely extend on the order of 0.5 to 8 ft (potentially more) below the groundwater table. *In light of this, dewatering is anticipated to play a critically important role in order to develop suitable subgrades* and a significant dewatering effort should generally be expected. To allow for construction in the dry, water levels should be lowered a minimum of 2 ft below the bottom of excavations *in advance of final excavation*. It has been our experience that groundwater drawdowns on the order of 1 to 2 ft can typically be achieved using submersible pumps that operate from filtered sump pits. Drawdowns exceeding about 2 ft will likely require alternative dewatering measures, such as deep well or vacuum well point systems. Note, however, that the silt and clay strata encountered in some of the soil borings are expected to be difficult to dewater, likely requiring the use of a vacuum well point system regardless of drawdown depths. Cleaner sand layers, on the other hand, are expected to have a fairly high hydraulic conductivity which may result in significant pumping rates. Supplemental dewatering in shallow sumps outside the footing lines may also be required. Dewatering means and methods are the contractor's responsibility. *If groundwater is not adequately controlled, significantly deeper undercuts, flatter side slopes, wider excavations and modifications to the temporary earth retention systems (if any) could be required.* The dewatering systems should be designed by a qualified professional engineer in conjunction with the temporary earth retention systems (if any) such that appropriate hydrostatic pressures are accounted for. *We recommend the existing structures be monitored for potential dewatering-induced settlement during construction.* Depending on the effectiveness of the dewatering system at lowering the water table below the bottom of the excavation, it may be necessary to install a stone stabilization layer at the bottom of the excavations to develop a working platform for construction activities. On past projects this has involved about 12 in. of coarse stone underlain or potentially enveloped by a geotextile fabric for separation and reinforcement purposes.

3. Foundation Design

We understand that new footings are generally planned to be extended about 13.5 ft below current site grades to match footing grades of the existing building, and footing subgrades at that depth are generally expected to consist of loose to medium dense sand and silt soils. However, it is our opinion that footings at somewhat shallower depths may also be feasible in some areas, which would likely reduce the dewatering effort and potentially the cost for disposal of decontaminated excavation spoils and dewatering effluent. As a third option, new structures could also be supported on deep foundations, such as helical piers, in order to further reduce the potential need for and/or extent of

dewatering and disposal of contaminated soils and groundwater. The foundation alternatives are further discussed in the following subsections.

A. Conventional Spread Footing Foundations

We understand that the new canopies are envisioned to be supported on conventional spread footings extending about 13.5 ft below current site grades to match footing grades of the existing building. A similar foundation system could also be considered for the raised patio (in lieu of mass undercutting or surcharging the peat, as discussed previously). Based on Borings 3, 4, 9 and 11, footing subgrades at these depths are anticipated to consist of native, loose to medium dense sand and silt soils. Note that some of the looser sands or sand layers containing peat seams could potentially require undercutting slightly below footing grades. Where undercutting occurs close to existing footings, care should be exercised not to undermine the existing foundations.

As discussed previously, effective dewatering is considered paramount in order to establish and maintain suitable foundation subgrades. However, even with effective dewatering measures in-place, some footing subgrades may remain fairly wet, and these subgrades should be stabilized with a thin (approximately 6-in. thick or more) layer of crushed clear stone that is compacted into the subgrade until deflection ceases. If the clear stone layer exceeds 12 in., it should be enveloped with non-woven geotextile fabric (e.g., Mirafi 160N or equivalent). Alternatively, footing subgrades could be stabilized with thin (i.e., 3 to 4-in. thick) lean mix concrete mud mats. The lean mix concrete should be able to develop a minimum 28-day design strength of 1,000 psi.

As noted above, dewatering to establish suitable foundation subgrades at about 13.5 ft below current site grades is anticipated to be a significant effort. In order to somewhat reduce the dewatering effort, as well as potentially the disposal costs for contaminated excavation spoils and contaminated dewatering effluent, it is our opinion that footings could potentially be constructed at shallower depths in some areas (i.e., at a sufficient distance from the existing building such that existing footings are outside of the influence zone from new footings), provided existing fill soils and peat/organic soils are undercut below the bottom of footings. Based on Borings 1, 3, 4, 9 and 11, we anticipate that undercut excavations would likely extend about 6.5 to 9.5 ft below current site grades. Undercut excavations should be dewatered as previously discussed, but required drawdown depths are expected to be reduced compared to the first foundation alternative. Once existing fill soils and peat layers have been undercut, footings could either be constructed directly on the exposed sand layers, or footing grades (e.g., at frost depth, a minimum of 4 ft below finish site grades) can be restored as discussed below.

We recommend the following parameters be used for foundation design:

- <u>Maximum net allowable bearing pressure</u>:
  - Footings bearing about 13.5 ft below the ground surface on native, loose to medium dense sand or silt soils: 3,000 psf

- Footings bearing on the top of native, loose sands, or on engineered backfill over native sands: 1,500 psf

- Minimum foundation widths:
  - Continuous wall footings: 18 in.
  - Column pad footings: 30 in.

- Minimum footing depths below finish site grades:
  - Exterior/perimeter footings: 4 ft
  - Interior footings: no minimum requirement

Footing subgrades should be checked by a CGC field representative to document that the subgrade soils are suitable for footing support and advise on corrective measures, if necessary. We recommend using a smooth-edged backhoe bucket for footing and undercut excavations. The base of undercut excavations should be widened beyond the footing edges at least 0.5 ft in each direction for each foot of undercut depth for stress distribution purposes. Granular soils exposed at footing grade or the bottom of undercut excavations *above the water table or with an effective dewatering system in-place* should be thoroughly recompacted with a large vibratory plate compactor or an excavator-mounted hoe-pack prior to backfilling or formwork/concrete placement to densify soils loosened during the excavation process. Soils potentially susceptible to disturbance from vibratory compaction (e.g., cohesive/fine-grained soils or sands near or below the water table) should be hand-trimmed. Subgrades that are fairly wet should be stabilized with a thin (approximately 6 in. thick) layer of crushed clear stone that is compacted into the subgrade until deflection ceases or protected with lean mix mud mats, as described above. OSHA slope guidelines should be followed if workers need to enter footing excavations.

In order to re-establish footing grade in undercut areas above the water table or with an effective dewatering system in-place, we generally recommend using granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557), in accordance with the Recommended Compacted Fill Specifications presented in Appendix D. Alternatively, 3-in. DGB that is placed in loose 10-in. lifts and compacted until deflection ceases can also be used to restore grades above the water table in undercut areas. Below the water table or where saturated soils remain despite concerted dewatering efforts, undercut excavations should be backfilled with crushed clear stone that is placed in loose lifts of 12 in. or less, which are subsequently compacted with a large vibratory plate compactor or excavator-mounted hoe-pack until deflection ceases. Where total clear stone layer thickness exceeds 12 in., the clear stone should be wrapped in non-woven geotextile fabric (e.g. Mirafi 160N or equivalent) to prevent migration of fines into the void spaces of the clear stone. Alternatively, foundation grade below the water table can be restored with lean mix concrete that is capable of developing a minimum 28-day strength of 1,000 psi. Note that with the use of lean mix concrete as backfill, undercut excavations should be laterally oversized 0.5 ft from the edges of the foundation and geotextile fabric is not required at the bottom of the excavation.

Provided the foundation design/construction recommendations discussed above are followed, we estimate that total and differential settlements should be on the order of 1.0 and 0.5 in., respectively.

B. Deep Foundations

As an alternative to conventional spread footing foundations, deep foundations could be considered to support the new structures. The advantage with deep foundations compared to conventional spread footing foundations is that excavations can generally be limited to fairly shallow depths (i.e., frost depth, a minimum of 4 ft below finish site grades for pile caps/grade beams), which is anticipated to significantly reduce the need for dewatering and likely also reduce the potential/cost for disposal of contaminated excavation spoils. Furthermore, the fairly shallow pile cap/grade beam excavations can most likely be sloped back, potentially eliminating the need for temporary earth retention and undermining/the potential for underpinning of existing footings. As structural loads are generally anticipated to be fairly light, helical piers would likely be a feasible foundation system for the planned site improvements, and helical piers may even be economically favorable compared to conventional spread footing foundations due to savings on dewatering and landfill fees.

Helical piers are generally expected to extend through the existing fill, peat and lower-strength soils, and bear within at least medium dense inorganic sand and silt strata, or potentially in the underlying stiff to very stiff clays. If higher helical pier capacities are desired, the piers may potentially have to be extended somewhat deeper to bear within dense to very dense sand strata. *Note that supplemental, deeper soil borings are recommended if higher-capacity helical piers will be required.* Helical pier capacity will vary depending on the number and size of helices, depth of installation and bearing stratum. Soil parameters for the design of helical piers are included in Table 2. Using these parameters, we used the commercially available software HeliCAP® 2.5.1, produced by Hubbell Power Systems, to estimate *ultimate* helical pier capacities for *vertically installed* helical piers with a three-helix configuration (10 in., 12 in. and 14 in.). Approximate target lengths (measured from existing site grades) for several *ultimate* helical pier capacities (in compression) are summarized in Table 2. *Since helical piers are proprietary, the helical pier capacities should be considered approximate, and the helical pier installer should determine the helix configuration and depth necessary to satisfy project requirements. Soil stratigraphy and properties should be expected to vary across the site, as shown in the borings, which will affect helical pier installation depths to achieve given capacity. Actual design depths should be determined by a separate, independent analysis using specific helix configurations proposed on the project.*

TABLE 2

Recommended Soil Parameters for Helical Pier Foundations [1]

Proposed Redevelopment

200 North First Street, City of Madison, Dane County, Wisconsin

Boring	Description	Approximate Depth below Existing Ground Surface (ft)	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)	Buoyant Unit Weight (pcf)	Angle of Internal Friction (deg)	Cohesion (psf)
3	Loose Variable Fill	0 to 5.0	115	125	63	Variable	
	Loose Peat	5.0 to 6.5	80	100	38	0	0
	Very Loose to Loose Sand with Shells and Occasional Peat Seams (Possible Sandy Marl)	6.5 to 17	115	125	63	30	0
	Medium Dense Sand with Shells (Possible Sandy Marl)	17 to 22	120	130	68	33	0
	Stiff Lean Clay	22 to 27	120	125	63	0 [2] / 25 [3]	1,500 [2] / 30 [3]
	Very Stiff Lean Clay	27 to 30+	125	130	68	0 [2] / 25 [3]	2,250 [2] / 45 [3]
4	Loose to Medium Dense Variable Fill	0 to 5.5	115	125	63	Variable	
	Loose Peat	5.5 to 8.0	80	100	38	0	0
	Loose Sand with Shells (Possible Sandy Marl)	8.0 to 11	115	125	63	30	0
	Medium Dense Sand with Shells (Possible Sandy Marl)	11 to 17	120	130	68	33	0
	Stiff Lean Clay	17 to 22	120	125	63	0 [2] / 25 [3]	1,250 [2] / 25 [3]
	Medium Dense Silt and Sand	22 to 27	120	130	68	32	0
	Stiff Lean to Silty Clay	27 to 30+	120	125	63	0 [2] / 25 [3]	1,000 [2] / 20 [3]
8	Very Loose to Loose Variable Fill	0 to 5.5	115	125	63	Variable	
	Loose Peat	5.5 to 7.0	80	100	38	0	0
	Loose Sand with Shells (Possible Sandy Marl)	7.0 to 11	115	125	63	30	0
	Medium Dense Silt	11 to 13	120	130	68	31	0
	Stiff Lean Clay	13 to 17	120	125	63	0 [2] / 25 [3]	1,500 [2] / 30 [3]
	Loose Sand	17 to 19	115	125	63	30	0
	Stiff Lean Clay	19 to 24	120	125	63	0 [2] / 25 [3]	1,500 [2] / 30 [3]
	Stiff to Very Stiff Lean Clay	24 to 30+	125	130	68	0 [2] / 25 [3]	2,000 [2] / 40 [3]

Notes: [1] Generalized to some degree; refer to boring logs for more detailed soil descriptions. Not including factor of safety (i.e., FS = 1).

[2] Short-term loading conditions.

[3] Long-term loading conditions.

Boring	Description	Approximate Depth below Existing Ground Surface (ft)	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)	Buoyant Unit Weight (pcf)	Angle of Internal Friction (deg)	Cohesion (psf)
9	Loose Variable Fill	0 to 5.5	115	125	63	Variable	
	Very Loose Peat	5.5 to 8.0	75	95	33	0	0
	Very Loose to Loose Sand with Shells (Possible Sandy Marl)	8.0 to 12	115	125	63	30	0
	Medium Dense Sand	12 to 22	120	130	68	33	0
	Stiff to Very Stiff Lean Clay	22 to 27	125	130	68	0 [(2)] / 25 [(3)]	2,000 [(2)] / 40 [(3)]
	Medium Stiff Lean Clay	27 to 32	115	120	58	0 [(2)] / 25 [(3)]	750 [(2)] / 15 [(3)]
	Medium Stiff to Stiff Lean Clay	32 to 42	120	125	63	0 [(2)] / 25 [(3)]	1,000 [(2)] / 20 [(3)]
	Very Stiff Lean Clay	42 to 47	125	130	68	0 [(2)] / 25 [(3)]	2,000 [(2)] / 40 [(3)]
	Very Dense Sand	47 to 52	130	140	78	36	0
	Very Dense Glacial Till	52 to 57	130	140	78	36	0
	Very Dense Probable Weathered Sandstone Bedrock	57 to 63	130	140	78	36	0
11	Very Loose to Medium Dense Variable Fill	0 to 7.5	115	125	63	Variable	
	Loose Peat	7.5 to 9.5	80	100	38	0	0
	Loose Sand with Shells (Possible Sandy Marl)	9.5 to 13	115	125	63	30	0
	Medium Dense Silt	13 to 17	120	130	68	31	0
	Dense Silt and Sand	17 to 22	125	135	73	33	0
	Stiff to Very Stiff Lean Clay	22 to 53	125	130	68	0 [(2)] / 25 [(3)]	2,000 [(2)] / 40 [(3)]
14	Stiff Cohesive Fill	0 to 3.0	120	125	63	0 [(2)] / 25 [(3)]	1,000 [(2)] / 20 [(3)]
	Medium Dense Granular Fill	3.0 to 5.5	120	130	68	31	0
	Medium Stiff Sandy Lean Clay	5.5 to 7.0	115	120	58	0 [(2)] / 25 [(3)]	750 [(2)] / 15 [(3)]
	Loose to Medium Dense Sand with Shells (Possible Sandy Marl)	7.0 to 12	115	125	63	30	0
	Medium Dense Silt and Sand	12 to 17	120	130	68	31	0
	Medium Dense Sand	17 to 20+	120	130	68	33	0

Notes: [(1)] Generalized to some degree; refer to boring logs for more detailed soil descriptions. Not including factor of safety (i.e., FS = 1).

[(2)] Short-term loading conditions.

[(3)] Long-term loading conditions.

**Table 3 - Estimated Helical Pier Depths
for a Representative 10 in., 12 in. and 14 in. Helix Configuration**

Boring	Approximate Helical Pier Depths below Existing Grade (ft)		
	Ultimate Capacity of 40 kips (Compression) (1)	Ultimate Capacity of 60 kips (Compression) (1)	Ultimate Capacity of 80 kips (Compression) (1)
3	18	Below 30 (2)	Below 30 (2)
4	15	26	Below 30 (2)
8	30	Below 30 (2)	Below 30 (2)
9	15	20	48
11	17	21	Below 53 (2)
14	16	20	Below 20 (2)

Notes:
1) Ultimate capacities do not include a factor of safety (i.e., FS = 1); appropriate factor of safety of 2 to 3, depending on level of load testing, should be applied to ultimate capacity to determine allowable capacity.
2) Deeper boring required to estimate anticipated pier depth.

The installation torque is correlated with capacity, although static load tests can also be completed to confirm the ultimate and allowable capacities. A minimum factor of safety of 2.0 to 3.0 is generally used for helical pier design. If a factor of safety of 2.0 is used to determine the allowable helical pier capacity, we recommend that a minimum of one static load test be performed to confirm the helical pier design satisfies the project requirements. The static load test should be performed on a pier installed to similar installation depth and torque as production piers. Additionally, the torque of each pier should be monitored during installation to document that each pier is torqued to the minimum torque established by the static load test or empirical correlations to ultimate capacity. If a static load test is not performed, we recommend using a minimum factor of safety of 2.5 to 3.0 in determining the allowable capacity, and the installation torque of each pier should be monitored, which is empirically correlated to the ultimate capacity. *Since there are multiple proprietary helical pier systems, as well as different methods for estimating helical pier capacities, it is the responsibility of the contractor to determine that their selected helical pier configuration, installation procedures and termination criteria satisfy the project requirements.*

Other helical pier considerations include the following:

- Prospective helical pier contractors should be aware of the potential presence of miscellaneous debris within the existing fill soils, as well as elevated gravel contents and cobbles/boulders in some of the deeper natural sand strata, which will likely impact helical pier installation and may require removal prior to installation. The helical pier installer should have provisions to deal with the presence of

potential obstructions. If obstructions are encountered at shallow depths, removing obstructions with an excavator would be one method to deal with the obstructions. Under some circumstances, using smaller diameter helix configuration may also assist in the installation process but may require deeper piers to develop capacity.

- The organic soils and potentially some of the existing fill may be corrosive, so the helical pier shafts should include corrosion protection, which may include hot-dip galvanizing, anti-corrosion coatings or increased steel shaft thickness.

- Loose fill, organic and lower-strength cohesive and fine-grained soils have relatively low lateral capacity, so *round helical pier shafts*, which have higher resistance to buckling, are recommended over square shafts. A buckling analysis should be completed to check that the pier shaft has adequate buckling resistance.

- If lateral loads are high enough such that vertical helical piers do not provide sufficient lateral resistance, battered helical piers can be considered. It is also possible that, as an alternative, battered micropiles could be considered in the event that high lateral loads need to be resisted.

- Pile caps should be located a minimum of 4 ft below finish grade for frost protection.

- Pile cap excavations should be sloped in accordance with OSHA slope guidelines if workers need to enter the excavations, and the excavation should be monitored by a competent person to determine the appropriate excavation slopes.

4. Seismic Site Class

In our opinion, the average soil properties in the upper 100 ft of the site (based on SPT blow counts "N-values" between 15 and 50 blows/ft, on average, in the sand and silt soils, and an average undrained shar strength between 1 and 2 ksf in the clays underlying the site) may be characterized as a stiff soil profile. This characterization would place the site in Site Class D for seismic design according to the International Building Code (see Table 1613.5.2).

5. Elevator and Loading Dock Lift Pits

Based on the findings in Boring 14, elevator and loading dock lift pit base slab subgrades are generally anticipated to consist of existing, medium dense granular fill over medium stiff clay (possible fill) and loose to medium dense native sand and silt soils. Compared to fill soils encountered in other portions of the site, the fill soils below the existing building appear to have been placed in a somewhat engineered manner, and the peat layer appears to have been removed prior to fill placement within the building pad. It the existing fill soils are found to be unsuitable for base slab support at the time of construction, or peat/organic soils are encountered at or slightly below

base slab grades, these soils should be undercut below the bottom of the base slabs, although the capacity for undercutting within the existing building is anticipated to be fairly limited.

To serve as a capillary break below the elevator and loading dock lift pit base slabs, the final 4 to 6 in. of soil placed below the slabs should consist of well-graded sand or gravel with no more than 5% by weight passing a No. 200 U.S. standard sieve. Note that some structural engineers require a 6-in. layer of DGB, such as 1¼ -in. DGB, below the slabs to increase the subgrade modulus immediately below the slabs. Fill and base layer material below the base slabs should be placed as described in the Site Preparation section of this report. For conventional slabs bearing on a 4 to 6-in. thick sand/gravel layer above a firm or adequately stabilized subgrade, a subgrade modulus of 75 pci can be used for slab design. Base slabs bearing on a minimum 6-in. thick layer of DGB above a firm or adequately stabilized base may be designed using a subgrade modulus of 100 pci. To further minimize the potential for moisture migration, a plastic vapor barrier can be also be utilized below the slabs.

The contact pressure at the bottom of the slabs should be limited to 1,500 psf in order to limit settlement to typically tolerable levels. If higher loads are expected, or unsuitable soils are found to extend fairly deep below the bottom of the slabs, the base slabs could be supported on helical piers, as discussed above. Helical piers can be installed with fairly compact equipment, such as a skid loader or mini excavator, capable of operating within the confines of the existing building.

We anticipate that the elevator pit and loading dock lift walls will be laterally supported by the base slabs, orthogonal walls and/or other structural means. Therefore, *at-rest* lateral earth pressures should be used during design of these walls. To reduce the buildup of such pressures, high-quality fill/backfill should be placed within 4 to 6 ft of the walls, consisting of well-graded sand or gravel having no more than 12% by weight passing the No. 200 U.S. standard sieve (i.e., USCS designations SP, SP-SM, GP or GP-GM). Soils containing cobbles/boulders should not be used in direct contact with the below-grade walls.

Compaction of the backfill within 3 to 5 ft of the walls should be performed with lightweight equipment to avoid the development of excessive lateral earth pressures. The wall backfill should be compacted to a minimum of 95% modified Proctor following Appendix D guidelines. Walls that are restrained from rotating and constructed in accordance with the above recommendations may be designed for an equivalent fluid pressure of 55 psf per ft of depth (*at rest conditions*). Additionally, the wall design should also account for hydraulic pressures (if any, such as potentially during the event of high groundwater levels) as well as surcharge effects that could be applied during or after construction. In the event of high groundwater levels, we recommend wrapping the elevator pit and loading dock lift pit in geomembrane to create a watertight structure (“bath tub”), and a sump crock be included in the base slab.

6. Pavement Design

We anticipate that pavement design will be controlled by the existing variable fill soils, and subgrades should be prepared as described in the Site Preparation section of this report, with recompaction/proof-rolling completed prior to base course placement. *Due to the widespread presence of mixed fill, we recommend that the budget include a generous contingency for subgrade undercutting/stabilization, which could potentially include about 12 in. (or more) of additional coarse aggregate (e.g., 3-in. DGB) over biaxial geogrid (e.g., Tensar BX Type 1 or equivalent).*

We anticipate that asphalt pavement in parking lots will primarily be exposed to automobile traffic with less than one 18-kip equivalent single axle load (ESAL) per day. In view of this, we have assumed Traffic Class I following Wisconsin Asphalt Pavement Association (WAPA) recommendations for smaller parking areas (i.e., up to 50 stalls) and driveways that are mainly used by light passenger vehicles. However, main sections of driveways are likely to experience heavier traffic loads due to truck traffic, and we understand that larger parking areas (i.e., over 50 stalls) may also be planned. For pavement areas where trucks will routinely travel and parking lots with more than 50 stalls, we have assumed a traffic load of less than 10 ESALs per day and Traffic Class II according to WAPA. We have also included a heavy-duty pavement section where higher truck traffic loads (up to 50 ESALs per day) are expected, such as in loading dock areas. The pavement sections summarized in Table 4 below were selected assuming a Soil Support Value "SSV" of 4.0 for a firm or adequately stabilized mixed fill subgrade and a design life of 20 years. Note that the pavement lifespan may be reduced somewhat by the presence of organic soils/peat that may settle over time, which may require additional maintenance.

TABLE 4 – Recommended Pavement Sections

Material	Thicknesses (in.)			WDOT Specification [1]
	Traffic Class I (Light Duty)	Traffic Class II (Medium Duty)	Traffic Class III (Heavy Duty)	
Bituminous Upper Layer [2,3]	1.5	1.75	2.0	Section 460, Table 460-1, 9.5 mm (light duty), 12.5 mm (medium and heavy duty)
Bituminous Lower Layer [2,3]	2.0	2.25	3.0	Section 460, Table 460-1, 12.5 mm (light duty), 19 mm (medium and heavy duty)
Dense Graded Base Course [2,4]	8.0	10.0	12.0	Sections 301 and 305, 3 in. and 1¼ in.
Total Thickness	**11.5**	**14.0**	**17.0**	

Notes:

1) Wisconsin DOT *Standard Specifications for Highway and Structure Construction*, latest edition, including supplemental specifications, and Wisconsin Asphalt Pavement Association *2018 Asphalt Pavement Design Guide*.

2) Compaction requirements:
   - Bituminous concrete: Refer to Section 460-3.
   - Base course: Refer to Section 301.3.4.2, Standard Compaction

3) Mixture Type LT bituminous; refer to Section 460, Table 460-2 of the *Standard Specifications*. Mixture type MT is recommended in heavy duty traffic areas. Note that an "H Grade" asphalt surface layer is recommended where there will be slow moving heavy truck traffic making turning movements.

4) The upper 4 in. should consist of 1¼-in. DGB; the bottom part of the layer can consist of 3-in. DGB.

The recommended pavement sections assume regular maintenance (crack sealing, etc.) will occur, as needed. Note that if traffic volumes are greater than those assumed, CGC should be allowed to review the recommended pavement sections and adjust them accordingly. Alternative pavement designs may prove acceptable and should be reviewed by CGC. If there is a delay between subgrade preparation and placing the base course, the subgrade should be recompacted.

Where concrete pavement may be used, such as in pavement areas subjected to concentrated wheel loads (e.g., dumpster pads, loading dock aprons, etc.), we recommend that the concrete pavement should be at least 6-in. thick, be underlain by at least 6 in. of DGB and contain mesh reinforcement for crack control. Concrete slabs underlain by a minimum 6-in. thick dense graded base layer over a firm or stabilized subgrade can be designed utilizing a subgrade modulus of 100 pci. Note that a thicker pavement section (more than 6 in. of concrete) may be required depending on pavement loads, which should be evaluated by a structural engineer.

7. Preliminary Stormwater Infiltration Potential

We understand the redevelopment of the site may involve stormwater infiltration areas. As the locations of the stormwater infiltration areas had not been determined at the time the soil borings were conducted, our preliminary evaluation of the stormwater infiltration potential encompasses the entire site and is fairly generalized. However, shallow soil conditions in the borings were fairly consistent and generally involved mixed fill with highly variable infiltration potential over lower-permeability organic/peat layers. The peat and organic layers were generally underlain by more permeable sand soils, but the groundwater table, which is the limiting layer for stormwater infiltration, was typically encountered within or just slightly below the peat/organic layers. Therefore, it is our opinion that the site is not suitable for infiltrating significant quantities of stormwater.

Infiltration Potential: The following is a summary of the estimated *preliminary* infiltration rates for the soils encountered in Borings 1 through 13, per Table 2 of the WDNR Conservation Practice Standard 1002, *Site Evaluation for Storm Water Infiltration*. The estimated *preliminary* infiltration rates are as follows:

• Silty clay loam (SiCL)	0.04 in./hr
• Sandy clay loam (SCL)	0.11 in./hr
• Peat (approximation)	0.13 in./hr
• Silt loam (SiL)	0.13 in./hr
• Loam (L)	0.24 in./hr
• Sandy loam (SL), gravelly sandy loam (GRSL)	0.50 in./hr
• Fine sandy loam (FSL)	0.50 in./hr
• Loamy fine sand (LFS)	0.50 in./hr
• Fine sand (FS)	0.50 in./hr
• Sand (S)	3.60 in./hr

Note that the infiltration rates should be considered very approximate since they are merely based on soil texture and do not account for in-place soil density and other factors, which will affect the infiltration rate. We recommend that the soils at and several feet below the bottom of stormwater management systems be checked by a geotechnical engineer or certified soil tester *in conjunction with the basin designer* to document that the soils are appropriate for the design infiltration rate or recommend remedial measures, if necessary. *Variability in the soil conditions should be expected across the site and within the stormwater basin that could result in a wide range of undercut depths to reach soil suitable for the design infiltration rate.* The Wisconsin Department of Safety and Professional Services Soil and Site Evaluation – Storm forms for Borings 1 through 13 are contained in Appendix E. Note that supplemental test pits may be required to develop final design infiltration rates for stormwater management design.

Groundwater: Groundwater was generally encountered at depths of about 5 to 8.5 ft in the soil borings. It must also be noted that some of the on-site soils exhibit redoximorphic features (redox or mottling) and/or low-chroma/high-value (gray) dominant color, which suggests the level of past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater. The groundwater table should be expected to fluctuate as discussed in the Subsurface Conditions section. Groundwater mounding effects should be considered during the design of infiltration systems.

Bedrock: Apparent sandstone bedrock was encountered in Boring 9 at about 57 ft below the ground surface. The depth and consistency of bedrock should be expected to vary across the site.

During construction, appropriate erosion control should be provided to prevent eroded soil from contaminating the stormwater management areas. Where appropriate, the stormwater system design should include pretreatment to remove fine-grained soils (silt/clay) and clogging materials (oils/greases) from stormwater prior to entering the infiltration areas. Additionally, a regular maintenance plan should be developed to remove silt/clay soils and clogging materials that may accumulate in the bottom of the stormwater management areas over time. Failure to adequately control fine-grained soils and clogging materials from entering the infiltration areas or failure to regularly remove fine-grained soils and clogging materials that accumulate at the base of the stormwater infiltration systems will likely cause the stormwater management systems to fail. Additionally, it is important that the soils in the bottom of the infiltration systems do not become compacted during construction or measures are taken to mitigate soils that are compacted during construction. Refer to WDNR Conservation Practice Standards 1002, 1003 and 1004, as well as NR151 for additional information.

CONSTRUCTION CONSIDERATIONS

Due to variations in weather, construction methods and other factors, specific construction problems are difficult to predict. Soil related difficulties which could be encountered on the site are discussed below:

- Due to the potentially sensitive nature of some of the on-site soils, we recommend that final site grading activities be completed during dry weather, if possible. Construction traffic should be avoided on prepared subgrades to minimize potential disturbance.

- Contingencies in the project budget for subgrade stabilization with coarse aggregate in pavement and floor slab areas should be increased if the project schedule requires that work proceed during adverse weather conditions.

- Earthwork construction during the late fall through early spring could be complicated as a result of wet weather and freezing temperatures. During cold weather, exposed subgrades should be protected from freezing before and after footing construction. Fill should never be placed while frozen or on frozen ground.

- Excavations extending greater than 4 ft in depth below the existing ground surface should be sloped or braced in accordance with current OSHA standards. Where adequate sloping is not possible, temporary earth retention systems will be required. Special care should be exercised not to undermine existing foundations.

- Based on the observations made during our field exploration, dewatering of footing and undercut excavations is expected, as previously discussed. In addition, water accumulating at the bottom of excavations as a result of precipitation or seepage should be quickly removed in a similar manner, with dewatering means and methods being the contractor's responsibility.

RECOMMENDED CONSTRUCTION MONITORING

The quality of the foundation, floor slab and pavement subgrades will be largely determined by the level of care exercised during site development. To check that earthwork and foundation construction proceed in accordance with our recommendations, the following operations should be monitored by CGC:

- Topsoil stripping and subgrade proof-rolling/compaction;
- Fill/backfill placement and compaction;
- Deep foundation installation (if any);
- Foundation excavation/subgrade preparation; and
- Concrete placement.

* * * * *

It has been a pleasure to serve you on this project. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.

Tim F. Gassenheimer, EIT, CST
Staff Engineer

Ryan J. Portman, PE, CST
Consulting Professional

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring Location Exhibit
Logs of Test Borings (14)
Particle Size Distribution Test Reports (2)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications
Appendix D - Recommended Compacted Fill Specifications
Appendix E - WDSPS Soil and Site Evaluation – Storm Forms (13 Borings)

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

Subsurface conditions for this study were explored by drilling 14 Standard Penetration Test (SPT) soil borings to planned depths between 10 and 75 ft below current site grades at locations selected by the planning team and located in the field by CGC in conjunction with City personnel. The borings were conducted by Badger State Drilling (under subcontract to CGC) on June 10 through 12 and 17, 2019 using a truck-mounted CME-55 and a track-mounted D-50 rotary drill rig equipped with hollow stem augers, mud rotary tooling and automatic SPT hammers. Note that auger and split-spoon refusal occurred in Borings 9 and 11, which were planned to be extended to 75 ft, at depths of about 63.5 ft on apparent sandstone bedrock and about 53 ft on a cobble/boulder or bedrock, respectively.

The soil borings were generally sampled at 2.5-ft intervals to a depth of 15 ft and at 5-ft intervals thereafter. The samples were obtained in general accordance with specifications for standard penetration testing, ASTM D 1586. The specific procedures used for drilling and sampling are described below.

1. Boring Procedures between Samples

   The boring is extended downward, between samples, by a hollow-stem auger. In the deeper Borings 9 and 11, mud-rotary drilling techniques were used below depths of 10 ft, implementing drilling mud/slurry to support the sidewalls of the boreholes and prevent hydrostatic failure of the bottom, while also transporting the drill cutting loosened by a roller bit to the ground surface.

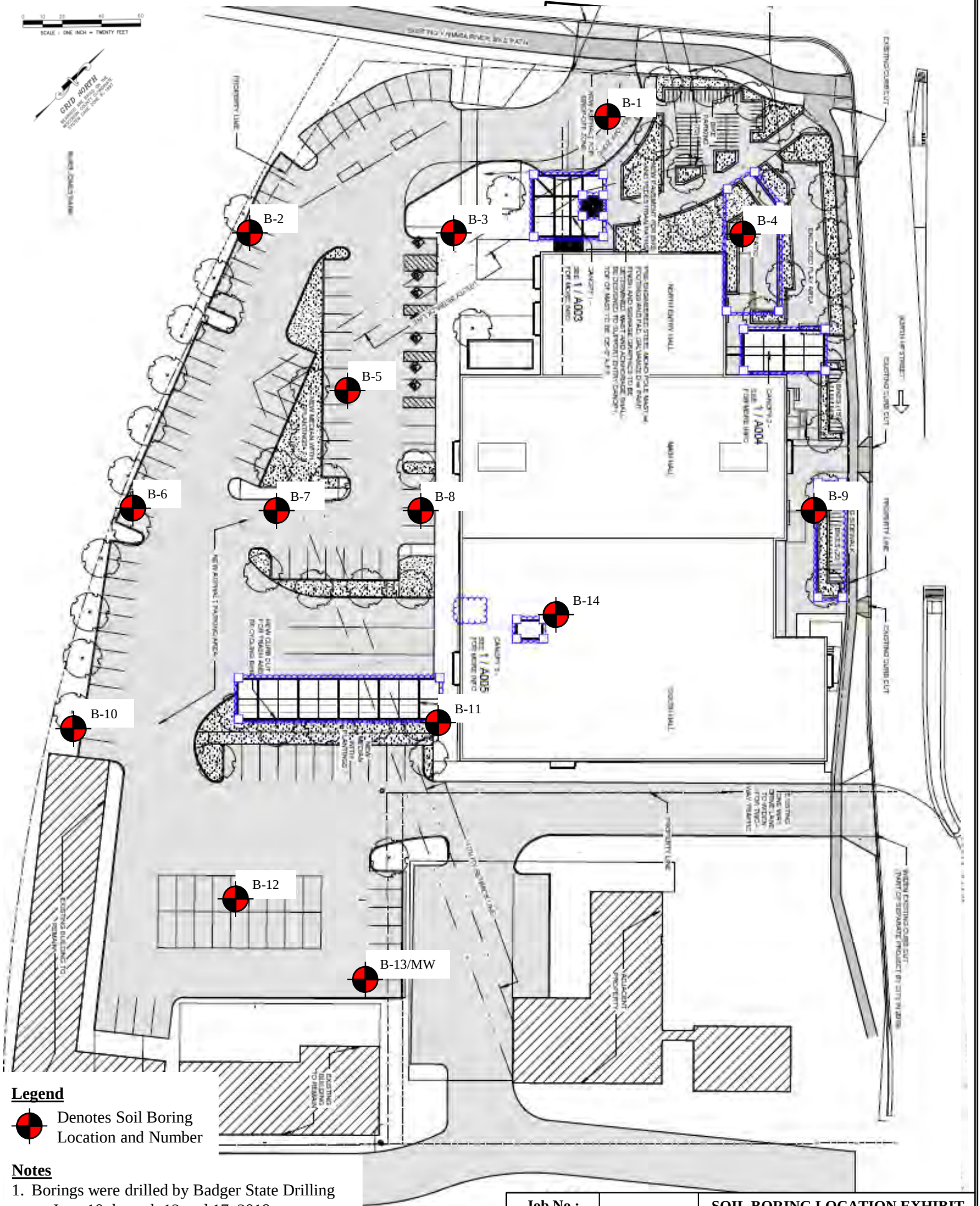
2. Standard Penetration Test and Split-Barrel Sampling of Soils
   (ASTM Designation: D 1586)

   This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of borings and is known as the Standard Penetration Resistance.

During the field exploration, the driller visually classified the soil and prepared a field log. Field screening of the soil samples for possible environmental contaminants was conducted by a City of Madison hydrogeologist during drilling. Water level observations were made in each boring during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the borings were generally backfilled to satisfy WDNR regulations. As an exception, a temporary groundwater monitoring well was installed in Boring 13 after the completion of drilling. The soil samples were delivered to our laboratory for visual classification by a geotechnical engineer using the Unified Soil Classification System, as well as laboratory testing. The final logs prepared by the engineer including laboratory test results, along with a Soil Boring Location Exhibit and a description of the Unified Soil Classification System are presented in Appendix B.

APPENDIX B

SOIL BORING LOCATION EXHIBIT
LOGS OF TEST BORINGS (13)
PARTICLE SIZE DISTRIBUTION TEST REPORTS (2)
LOG OF TEST BORING-GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM



Legend

Denotes Soil Boring Location and Number

Notes

1. Borings were drilled by Badger State Drilling on June 10 through 12 and 17, 2019.
2. Boring locations are approximate.
3. Base map was prepared by MSR.

Job No.: C19051-10	**CGC, Inc.**	**SOIL BORING LOCATION EXHIBIT**
Date: 06/2019		**Proposed Redevelopment**
		200 North First Street
		City of Madison, Dane Co., WI

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **1**
Surface Elevation (ft) **852.0±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4± in. Topsoil FILL (OL)					
1	■	16	M	14		FILL: Loose to Medium Dense, Very Dark Brown Fine to Coarse Sand, Some Silt, Little Gravel, Trace Organics, Scattered Ceramic Tile Fragments, Possible Cinders and/or Asphalt Pieces					
2	■	12	M	4		*10YR 2/2 Sandy Loam (Fill)*					
					5						
3	■	16	M/W	6	▽	Loose, Black Sedimentary to Fibrous PEAT, Trace Sand (PT)		50.1			
						10YR 2/1 Silt Loam/Peat					
4	■	18	W	10		Loose, Gray to Light Brownish Gray Fine SAND, Trace Silt and Gravel, Scattered Shells (SP)					
					10	*10YR 6/1, 6/2 Fine Sand*					
						End of Boring at 10 ft					
						Borehole Backfilled with Bentonite Chips					
					15						
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **7.0'** Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ **20 Mins.**
Depth to Water _____ _____ _____ **NW** ▼
Depth to Cave in **8595** _____ _____ _____ **5.4'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/10/19** End **6/10/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **2**
Surface Elevation (ft) **851.0±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						10± in. Asphalt Pavement / 8± in. Base Course					
1		16	M	17		FILL: Very Loose to Medium Dense, Light Yellowish Brown Fine to Coarse Sand, Some Silt and Gravel *10YR 6/4 Gravelly Sandy Loam (Fill)*					
					▽						
2		12	W	2							
					5						
3		18	M/W	3		Very Loose, Very Dark Gray to Black/Strong Brown (Mottled) Sedimentary PEAT, Trace Sand (PT - Possible Fill) *Faint Possible Petroleum/Chemical Odor* *2.5Y 3/1, 2.5/1 (Redox: c2d 7.5YR 4/6) Silt Loam/Peat*	(0.5)	86.8			17.2
4		18	W	11							
					10	Medium Dense, Gray Fine to Coarse SAND, Little Gravel, Trace Silt, Scattered Shells and Organic Pockets (SP) *Faint Possible Petroleum/Chemical Odor* *2.5Y 5/1 Sand*					
					15	End of Boring at 10 ft Borehole Backfilled with Bentonite Chips; Surface Patched with Asphalt Cold Patch					
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **3.0'**	Upon Completion of Drilling			
Time After Drilling	**(Probable**			**20 Mins.**
Depth to Water	**Perched**			**NW** ▼
Depth to Cave in	**Water)**			**4.0'**

8595

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/10/19** End **6/10/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **3**
Surface Elevation (ft) **851.5±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4± in. Asphalt Pavement / 7± in. Base Course					
1	■	12	M	6		FILL: Loose Mixture of Sand and Silt, Little Gravel, Scattered Possible Cinders *Faint Possible Petroleum/Chemical Odor* *Variable Fill*					
2	■	10	M	7							
					5	FILL: Loose Mixture of Sand and Clay, Scattered Glass Fragments and Organic Seams *Faint Possible Petroleum/Chemical Odor* *Variable Fill*					
3A/3B	■	12	M	6				74.2			
4	■	18	W	3		Loose, Black Sedimentary to Fibrous PEAT, Trace Sand (PT) *10YR 2/1 Silt Loam/Peat*					
					10						
5	■	18	W	7		Loose, Gray Fine SAND, Trace Silt and Gravel, Scattered Shells and Peat Seams (SP) *2.5Y 5/1 Fine Sand, Silt Loam/Peat Seams*					
6	■	12	W	8		Very Loose, Gray Fine SAND, Trace Silt and Gravel, Scattered Shells (SP) *2.5Y 5/1 Fine Sand*					
					15						
7	■	16	W	14		Loose, Gray Fine to Medium SAND, Trace Silt and Gravel, Scattered Shells (SP) *10YR 5/1 Sand*					
					20	Loose, Grayish Brown Fine SAND, Trace Silt and Gravel (SP) *10YR 5/2 Fine Sand*					
8	■	18	W	14		Medium Dense, Gray Fine to Medium SAND, Trace Silt and Gravel, Scattered Shells (SP)	(1.5-1.75)	24.0			
					25	Stiff, Gray Lean CLAY, Trace Sand, Scattered Thin Silt and Fine Sand Seams (CL)					
						Very Stiff, Gray Lean CLAY, Trace Sand (CL)					
9	■	18	W	21			(2.0-2.5)	21.6	30	16	
					30	End of Boring at 30 ft Borehole Backfilled with Bentonite Chips; Surface Patched with Asphalt Cold Patch					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.0'**	Upon Completion of Drilling			
Time After Drilling				**20 Mins.**
Depth to Water				**5.0'** ▼
Depth to Cave in				**7.0'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/11/19** End **6/11/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **4**
Surface Elevation (ft) **852.0±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4± in. Topsoil FILL (OL)					
1		10	M	12		FILL: Medium Dense Mixture of Sand and Clay, Little Gravel, Trace Organics					
						Variable Fill					
2		12	M	4		FILL: Very Loose to Loose, Yellowish Brown Fine Sand, Trace to Little Silt, Trace Gravel					
					5	*10YR 5/4 Fine Sand to Loamy Fine Sand (Fill)*					
3		14	M	5		Loose, Black Sedimentary PEAT, Trace Sand (PT)		139.3			38.2
						10YR 2/1 Silt Loam/Peat					
4		12	W	5		Loose, Light Gray to Gray Fine to Medium SAND, Trace Silt and Gravel, Scattered Shells (SP)					
					10	*2.5Y 7/1, 10YR 6/1 Sand*					
5		10	W	20		Medium Dense, Gray to Brown Fine to Medium SAND, Little Gravel, Trace Silt, Scattered Shells (SP)					
						2.5Y 5/1, 10YR 5/3 Sand					
6		10	W	24		Medium Dense, Gray Fine SAND, Trace Silt and Gravel, Scattered Shells and Organic Pockets (SP)					
					15	*2.5Y 5/1, 10YR 6/1 Fine Sand*					
7		14	W	5		Stiff, Gray Lean CLAY, Trace Sand (CL)	(1.0-1.5)	23.2			
					20						
						Medium Dense, Light Brownish Gray Laminated SILT and Fine SAND (ML/SP)					
8		16	W	18							
					25						
						Stiff, Gray Lean to Silty CLAY, Trace Sand, Scattered Thin Silt Seams (CL/CL-ML)					
9		16	W	17			(1.0-1.25)	20.8			
					30	End of Boring at 30 ft					
						Borehole Backfilled with Bentonite Chips					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.0'** Upon Completion of Drilling ____
Time After Drilling ____ ____ ____ **20 Mins.**
Depth to Water ____ ____ ____ **7.6'** ▼
Depth to Cave in **8595** ____ ____ ____ **8.3'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/12/19** End **6/12/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **5**
Surface Elevation (ft) **851.5±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						5± in. Asphalt Pavement / 4± in. Base Course					
1A/1B		12	M	9		FILL: Loose, Light Yellowish Brown Fine to Medium Sand, Some Silt and Gravel *10YR 6/4 Gravelly Sandy Loam (Fill)*	(1.0-1.5)	18.2			
2		16	M	4	5	Stiff, Gray Lean CLAY, Little Sand (CL - Possible Fill) *Possible Petroleum Odor* *2.5Y 6/1 Silty Clay Loam*		37.1			8.3
3		14	M/W	8		Very Loose to Loose, Black Organic SILT, Little Sand, Scattered Sand Seams (OL/ML) *Possible Petroleum/Chemical Odor* *10YR 2/1 Silt Loam*					
4		18	W	15	10	Loose, Gray Fine SAND, Trace Silt and Gravel, Scattered Shells (SP) *Faint Possible Petroleum/Chemical Odor* *2.5Y 5/1 Fine Sand*					
					15	Medium Dense, Dark Gray Fine to Medium SAND, Little Gravel, Trace Silt, Scattered Shells, Interbedded with Very Dark Gray SILT, Trace Sand and Organics (SP/ML) *Possible Petroleum/Chemical Odor* *2.5Y 4/1, GLEY1 3/N Stratified Sand and Silt Loam*					
					20	End of Boring at 10 ft Borehole Backfilled with Bentonite Chips; Surface Patched with Asphalt Cold Patch					
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.0'** Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ **30 Mins.**
Depth to Water _____ _____ _____ **6.8'** ▼
Depth to Cave in **8595** _____ _____ _____ **7.8'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/11/19** End **6/11/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **6**
Surface Elevation (ft) **851.0±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						10± in. Asphalt Pavement / 5± in. Base Course					
1		10	M	10		FILL: Very Loose to Loose Mixture of Sand and Sandy Silt *Variable Fill*					
2		2	M	2		Very Limited Recovery in Sample 2					
					5	Loose, Black Sedimentary to Fibrous PEAT, Trace Sand (PT) *10YR 2/1 Silt Loam/Peat*					
3		16	M/W	8							
						Loose, Gray Fine to Medium SAND, Trace Silt and Gravel, Scattered Shells (SP) *10YR 6/1 Sand*					
4		18	W	11	10	Medium Dense, Gray Fine SAND, Trace Silt and Gravel, Numerous Shells, Scattered Thin Peat Seams (SP) *Faint Foul/Organic Odor* *2.5Y 5/1 Fine Sand*					
					15	End of Boring at 10 ft Borehole Backfilled with Bentonite Chips; Surface Patched with Asphalt Cold Patch					
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.0'** Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ **20 Mins.**
Depth to Water _____ _____ _____ **6.0'** ▼
Depth to Cave in **8595** _____ _____ _____ **7.0'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/10/19** End **6/10/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **7**
Surface Elevation (ft) **851.5±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						7± in. Asphalt Pavement / 4± in. Base Course					
1		12	M	10		FILL: Stiff, Yellowish Brown Sandy Lean Clay, Little Gravel, Scattered Concrete Fragments and Possible Cinders	(1.25-1.5)	9.8			
						10YR 5/6 Sandy Clay Loam (Fill)					
2		14	M	4				48.8			
					5	FILL: Very Loose to Loose, Very Dark Brown Organic Silt to Sedimentary Peat, Little Sand and Gravel, Scattered Possible Cinders					
3		16	M/W	7		*10YR 2/2 Silt Loam/Peat (Fill)*		24.2			
						▼					
4		18	W	7		Loose, Gray Fine to Medium SAND, Trace Silt and Gravel, Scattered Shells and Thin Peat Seams (SP)					
					10	*USDA: 2.5Y 6/1 Fine Sand, Silt Loam/Peat Seams*					
						P200 (Sample 4): 4.1%					
						End of Boring at 10 ft					
						Borehole Backfilled with Bentonite Chips; Surface Patched with Asphalt Cold Patch					
					15						
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.0'** Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ **30 Mins.**
Depth to Water _____ _____ _____ **7.8'** ▼
Depth to Cave in **8595** _____ _____ _____ **8.0'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/11/19** End **6/11/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **8**
Surface Elevation (ft) **852.0±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4± in. Asphalt Pavement / 8± in. Base Course					
1		14	M	6		FILL: Very Loose to Loose Mixture of Sand and Organic Silt *Variable Fill*					
2		14	M	2							
3A/3B		16	M	8	5	FILL: Very Loose, Black Fine to Coarse Sand, Trace Silt and Gravel (Possible Foundry Sand) *2.5Y 2.5/1 Sand (Fill)*					
4		16	W	8		Loose, Black Sedimentary to Fibrous PEAT, Trace Sand (PT) *10YR 2/1 Silt Loam/Peat*					
5		16	W	15	10	Loose, Gray Fine SAND, Trace Silt and Gravel, Scattered Shells (SP) *2.5Y 6/1 Fine Sand*	(0.5-1.0)				
6		14	W	7		Loose, Gray to Dark Gray Fine to Medium SAND, Trace Silt and Gravel, Scattered to Numerous Shells (SP) *Faint Possible Petroleum/Chemical Odor* *2.5Y, 5Y 4/1 Sand*	(1.0-2.0)	20.3	26	16	
7A/7B		18	W	7	15	Medium Dense, Gray SILT, Trace Sand (ML) *10YR 5/1 Silt Loam*					
8		16	W	7	20	Stiff, Gray Lean CLAY, Trace Sand (CL) *10YR 5/1 Silty Clay Loam*	(1.25-2.0)	21.3			
9		16	W	9	25	Loose, Gray Fine SAND, Trace Silt and Gravel (SP) Stiff to Very Stiff, Gray Lean CLAY, Trace Sand (CL)	(1.5-2.25)	22.3			
					30		(1.75-2.25)	21.1			
						End of Boring at 30 ft Borehole Backfilled with Bentonite Chips; Surface Patched with Asphalt Cold Patch					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.5'** Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ **20 Mins.**
Depth to Water _____ _____ _____ **8.0'** ▼
Depth to Cave in **8595** _____ _____ _____ **8.5'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/11/19** End **6/11/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **9**
Surface Elevation (ft) **851.5±**
Job No. **C19051-10**
Sheet **1** of **2**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						8± in. Topsoil FILL (OL)					
1		16	M	6		FILL: Loose Mixture of Sand and Sandy Silt *Variable Fill*					
2		6	M	4		FILL: Very Loose to Loose Mixture of Sand and Organic Silt, Scattered Possible Cinders *Variable Fill*					
3		14	M/W	2	5	Very Loose, Black Sedimentary PEAT, Trace Sand (PT) *10YR 2/1 Silt Loam/Peat*		111.7			31.4
4		16	W	4		Very Loose to Loose, Gray to Dark Gray Fine to Medium SAND, Trace Silt and Gravel, Scattered to Numerous Shells (SP) *Foul/Organic Odor* *2.5Y 5/1, 5Y 4/1 Sand*					
5		16	W	20	10	Medium Dense, Gray Laminated Fine SAND, Trace and Some Silt (SP/SM) *2.5Y 5/1 Stratified Fine Sand and Loamy Fine Sand*					
6		10	W	22	15	Medium Dense, Grayish Brown Fine to Medium SAND, Trace Silt and Gravel (SP)					
7		18	W	7	20	Stiff to Very Stiff, Gray Lean CLAY, Trace Sand (CL)	(1.75-2.25)	21.9			
8		16	W	13	25	Medium Stiff, Grayish Brown Lean CLAY, Trace Sand, Scattered Thin Silt and Fine Sand Seams (CL)	(0.5-1.0)	23.1	25	14	
9		18	W	8	30	Medium Stiff to Stiff, Grayish Brown Lean CLAY, Trace Sand, Scattered Silt Seams (CL)	(1.25-1.5)	23.4			
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **7.0'** Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in **8595** _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/12/19** End **6/12/19**
Driller **BSD** Chief **JF** Rig **D-50**
Logger **DC** Editor **TFG**
Drill Method **4.25" HSA (0-10') / 3.875" RB-DM (10-63.5'); Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **9**
Surface Elevation **851.5±**
Job No. **C19051-10**
Sheet **2** of **2**

2921 PERRY STREET, MADISON, WIS. 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						Medium Stiff to Stiff, Grayish Brown Lean CLAY, Trace Sand, Scattered Silt Seams (CL)					
10	■	18	W	12	40		(0.75-1.0)	22.9			
						Very Stiff, Gray Lean CLAY, Trace Sand (CL)					
11	■	16	W	12	45		(2.0-2.25)	25.3			
						Very Dense, Light Brownish Gray Fine to Coarse SAND, Trace Silt and Gravel (SP)					
12	■	18	W	65	50						
						Very Dense, Gray Fine to Coarse SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)					
13	■	4	W	50/4"	55						
						Very Dense, Pale Brown Fine to Medium SAND, Little Silt and Gravel (SP-SM - Probable Weathered Sandstone Bedrock)					
14	■	6	W	50/2"	60						
15	■	0	-	50/0"		End of Boring/Auger and Split-Spoon Refusal on Apparent Sandstone Bedrock at 63.5 ft					
					65	Borehole Backfilled with Bentonite Chips/Slurry					
					70						

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **10**
Surface Elevation (ft) **851.0±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						7± in. Asphalt Pavement / 6± in. Base Course					
1		14	M	8		FILL: Loose, Pale Brown Fine Sand, Trace Silt and Gravel *10YR 6/3 Fine Sand (Fill)*					
2		14	M/W	2		FILL: Very Loose Mixture of Sand and Clay, Little Gravel, Trace Organics *Variable Fill*					
3A/3B		18	M/W	6	5	Loose, Black Sedimentary PEAT, Some Sand (PT) *2.5Y 2.5/1 Fine Sandy Loam to Loam/Peat*		42.0			
4		18	W	8		Loose, Gray Fine SAND, Little Silt, Trace Gravel, Numerous Shells, Scattered Peat Seams (SP-SM) *2.5Y 5/1 Loamy Fine Sand, Silt Loam/Peat Seams*					
					10	Loose, Gray Fine SAND, Trace Silt and Gravel, Scattered Shells (SP) *2.5Y 5/1 Fine Sand*					
						End of Boring at 10 ft					
					15	Borehole Backfilled with Bentonite Chips; Surface Patched with Asphalt Cold Patch					
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.5'** Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ **20 Mins.**
Depth to Water _____ _____ _____ **5.3'** ▼
Depth to Cave in **8595** _____ _____ _____ **5.3'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/12/19** End **6/12/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **11**
Surface Elevation (ft) **852.0±**
Job No. **C19051-10**
Sheet **1** of **2**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						5± in. Asphalt Pavement / 10± in. Base Course					
1		10	M	17		FILL: Medium Dense Mixture of Sand and Concrete/Asphalt Rubble *Variable Fill*					
2		12	M	6		FILL: Loose, Yellowish Brown Silty to Clayey Fine to Medium Sand, Trace Gravel, Scattered Coal/Organic Pockets *10YR 5/4 Sandy Loam (Fill)*					
3		16	W	2	5		(<0.25)	104.9			21.5
4A/4B		18	M/W	9		FILL: Very Loose Mixture of Silty Sand and Sedimentary Peat *Possible Chemical/Petroleum Odor* *Variable Fill*		126.5			
5		12	M/W	8	10	Loose, Black Sedimentary to Fibrous PEAT, Trace Sand (PT) *10YR 2/1 Silt Loam/Peat*					
6		18	W	25		Loose, Gray Fine SAND, Trace Silt and Gravel, Scattered Shells (SP) *2.5Y 6/1 Fine Sand*					
7		14	W	33	15	Loose, Gray Fine to Medium SAND, Trace Silt and Gravel, Scattered Shells (SP) *2.5Y 6/1 Sand*					
					20	Medium Dense, Gray SILT to Sandy SILT (ML) *2.5Y 6/1 Silt Loam to Loam*					
						Dense, Gray to Yellowish Brown Laminated Sandy SILT and Fine SAND, Trace Silt (ML/SP)					
8		18	W	17	25	Stiff to Very Stiff, Grayish Brown Lean CLAY, Scattered Thin Fine Sand and Silt Seams (CL)	(1.25-3.0)	21.6			
9		18	W	12	30		(2.5-2.75)	21.7			
10		18	W	11	35		(1.0-1.75)				

WATER LEVEL OBSERVATIONS

While Drilling ▽ **6.0'** Upon Completion of Drilling _____
Time After Drilling **(Possible** _____ _____ **30 Mins.**
Depth to Water **Perched** _____ _____ **NW** ▼
Depth to Cave in **Water)** _____ _____ **3.0'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/10/19** End **6/10/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **4.25" HSA (0-10') / 3.875"**
RB-DM (10-53'); Autohammer

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **11**
Surface Elevation **852.0±**
Job No. **C19051-10**
Sheet **2** of **2**

2921 PERRY STREET, MADISON, WIS. 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						Stiff to Very Stiff, Grayish Brown Lean CLAY, Scattered Thin Fine Sand/Silt Seams (CL)					
11		18	W	12			(2.0-2.75)				
					40						
12		18	W	24			(1.75)	19.5			
					45						
13		18	W	21			(1.75-2.25)				
					50						
14		0	-	50/0"		End of Boring/Auger and Split-Spoon Refusal on Possible Cobble/Boulder or Bedrock at 53 ft					
					55	Borehole Backfilled with Bentonite Chips/Slurry; Surface Patched with Asphalt Cold Patch					
					60						
					65						
					70						

8595

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **12**
Surface Elevation (ft) **852.0±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4± in. Asphalt Pavement / 7± in. Base Course					
1	■	10	M	34		FILL: Dense to Very Dense Mixture of Sand and Gravel, Trace Silt *Variable Fill*					
2	■	1	M	50/1"		Drove Stone near 3.5 ft - Very Limited Recovery in Sample 2					
					5						
3	■	12	M/W	12		Loose to Medium Dense, Gray Fine to Medium SAND, Trace Silt and Gravel, Scattered Shells and Wood Pieces (SP) *2.5Y 6/1 Sand*					
4	■	18	W	8							
					10	End of Boring at 10 ft Borehole Backfilled with Bentonite Chips; Surface Patched with Asphalt Cold Patch					
					15						
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **5.5'** Upon Completion of Drilling ____
Time After Drilling ____ ____ ____ **20 Mins.**
Depth to Water ____ ____ ____ **6.0'** ▼
Depth to Cave in **8595** ____ ____ ____ **6.0'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/12/19** End **6/12/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **13**
Surface Elevation (ft) **852.0±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4± in. Asphalt Pavement / 8± in. Base Course					
1	■	6	M	50/2"		FILL: Very Dense, Dark Grayish Brown Fine to Coarse Sand, Some Silt, Little Gravel, Scattered Cobbles and Possible Cinders *10YR 4/2 Sandy Loam (Fill)*					
2	■	4	M	24							
					5	FILL: Medium Dense Mixture of Concrete and Asphalt Rubble *Variable Fill*					
3A/3B	■	16	M	3				173.5			
						Very Loose, Gray to Dark Gray to Black Laminated Fine SAND, SILT and Sedimentary PEAT (SP/ML/PT - Possible Fill) *2.5Y 6/1, 4/1, 2.5/1 Stratified Fine Sand, Silt Loam and Silt Loam/Peat*					
4	■	16	W	6	10						
5	■	14	W	18							
						Very Loose, Black Sedimentary to Fibrous PEAT, Trace Sand (PT) *10YR 2/1 Silt Loam/Peat*		21.5			
6	■	18	W	30	15						
						Loose, Gray Fine SAND, Trace Silt and Gravel, Scattered Shells (SP) *2.5Y 5/1 Fine Sand*					
						Medium Dense, Gray Fine SAND, Little to Some Silt (SP-SM/SM) *10YR 5/1 Fine Sand* P200 (Samples 5 and 6): 14.8%					
					20	End of Boring at 15 ft					
						Set Temporary 1-in. PVC Monitoring Well at 14 ft; see attached Monitoring Well Construction and Development Forms for Details					
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.0'** Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ **7/3/19**
Depth to Water _____ _____ _____ **6.0'** ▼
Depth to Cave in **8595** _____ _____ _____ _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/11/19** End **6/11/19**
Driller **BSD** Chief **MC** Rig **CME-55**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project **Proposed Redevelopment**
200 North First Street
Location **City of Madison, Dane Co., WI**

Boring No. **14**
Surface Elevation (ft) **852.0±**
Job No. **C19051-10**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4.5± in. Concrete Slab / 8± in. Base Course					
1	■	12	M	13		FILL: Stiff, Yellowish Brown Lean Clay, Little to Some Sand, Little Gravel, Scattered Sand Seams	(1.0-1.25)				
2	■	15	M	19		FILL: Medium Dense, Light Yellowish Brown Fine to Coarse Sand, Some Silt and Gravel					
3	■	18	M/W	7	5	Medium Stiff, Gray to Yellowish Brown Sandy Lean CLAY, Little Gravel (CL - Possible Fill)	(0.75-1.0)				
4	■	18	W	7		Loose to Medium Dense, Gray Fine SAND, Trace Silt and Gravel, Scattered Shells and Organic Matter (SP)					
5	■	18	W	12	10	Medium Dense, Gray SILT to Clayey SILT, Trace Sand (ML)	(0.5-1.5)				
6	■	10	W	24		Medium Dense, Gray to Yellowish Brown Laminated Sandy SILT and Fine SAND, Trace Silt (ML/SP)					
7	■	18	W	15	15	Medium Dense, Grayish Brown Fine SAND, Little Silt, Trace Gravel (SP-SM)					
					20	End of Boring at 20 ft Borehole Backfilled with Bentonite Chips; Surface Patched with Concrete Patch					
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **7.0'** Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ **30 Mins.**
Depth to Water _____ _____ _____ **7.2'** ▼
Depth to Cave in **8595** _____ _____ _____ **7.5'**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **6/17/19** End **6/17/19**
Driller **BSD** Chief **JF** Rig **D-50**
Logger **MG** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.5	9.6	85.6	4.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.8		
#8	99.4		
#10	99.3		
#16	98.2		
#30	95.5		
#40	89.7		
#50	70.4		
#80	27.6		
#100	14.1		
#200	4.1		

* (no specification provided)

Material Description

Gray Fine to Medium Sand, Trace Silt and Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4291 D_{85}= 0.3799 D_{60}= 0.2627
D_{50}= 0.2334 D_{30}= 0.1851 D_{15}= 0.1521
D_{10}= 0.1127 C_u= 2.33 C_c= 1.16

Classification

USCS= SP AASHTO=

Remarks

USDA: Fine Sand

Sample Number: B-7: S-3

Date: 6/19/19

CGC,Inc.

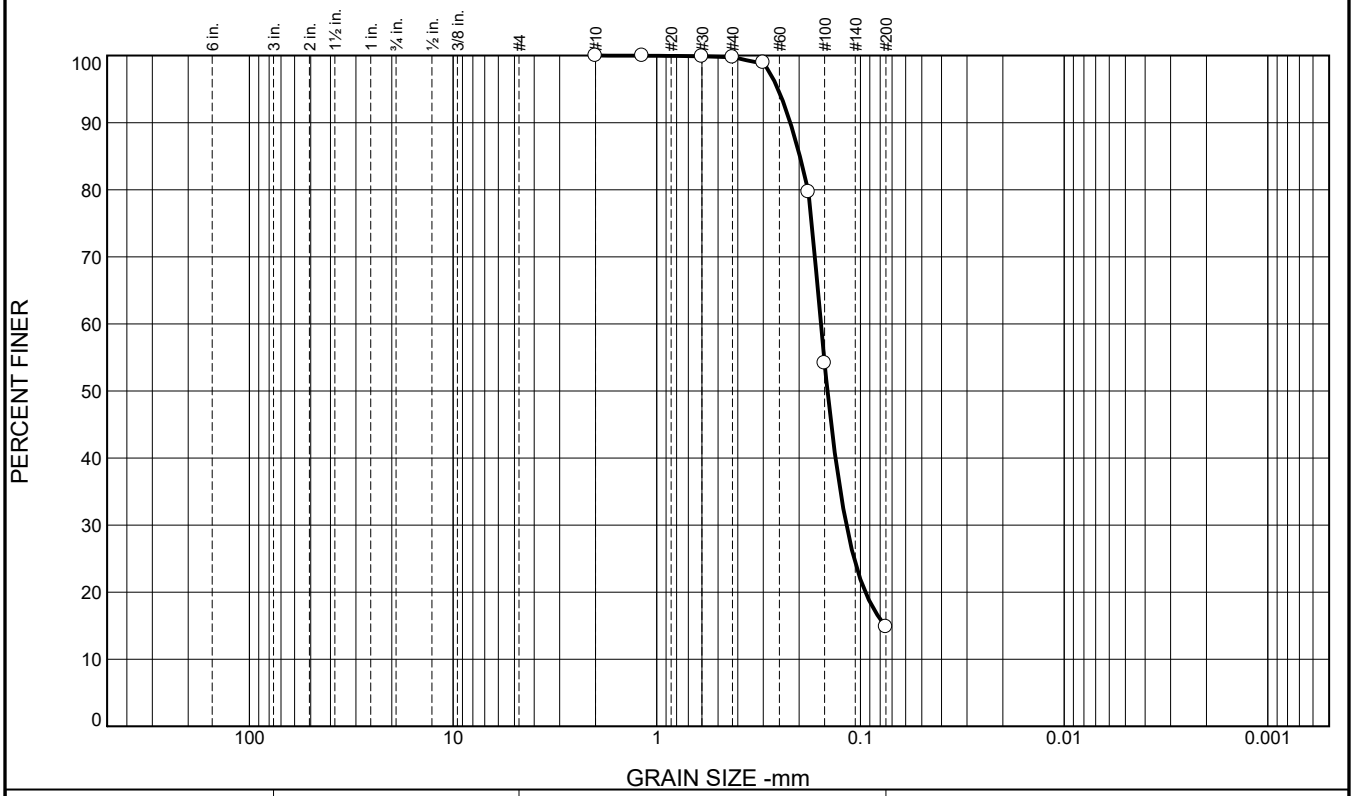
Client: City of Madison - Engineering
Project: Redevelopment 200 N. First St., Madison

Project No: C19051-10 **Figure**

Tested By: DRW **Checked By:** TFG

8595

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	85.0	14.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#16	100.0		
#30	99.9		
#40	99.8		
#50	98.9		
#80	79.7		
#100	54.2		
#200	14.8		

* (no specification provided)

Material Description

Brown Fine Sand, Some Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2210 D_{85}= 0.1984 D_{60}= 0.1564
D_{50}= 0.1452 D_{30}= 0.1172 D_{15}= 0.0758
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

USDA: Fine Sand

Sample Number: B-13: S-5 + S-6

Date: 6/19/19

CGC,Inc.

Client: City of Madison - Engineering
Project: Redevelopment 200 N. First St., Madison

Project No: C19051-10 **Figure**

Tested By: DRW **Checked By:** TFG

CGC, Inc.

LOG OF TEST BORING

General Notes

DESCRIPTIVE SOIL CLASSIFICATION

Grain Size Terminology

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse	¾" to 3"	¾" to 3"
Fine	4.76 mm to ¾"	#4 to ¾"
Sand: Coarse	2.00 mm to 4.76 mm	#10 to #4
Medium	0.42 to mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm	#200 to #40
Silt	0.005 mm to 0.074 mm	Smaller than #200
Clay	Smaller than 0.005 mm	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

General Terminology

Physical Characteristics
Color, moisture, grain shape, fineness, etc.
Major Constituents
Clay, silt, sand, gravel
Structure
Laminated, varved, fibrous, stratified, cemented, fissured, etc.
Geologic Origin
Glacial, alluvial, eolian, residual, etc.

Relative Density

Term	"N" Value
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Over 50

Relative Proportions Of Cohesionless Soils

Proportional Term	Defining Range by Percentage of Weight
Trace	0% - 5%
Little	5% - 12%
Some	12% - 35%
And	35% - 50%

Consistency

Term	q_u-tons/sq. ft
Very Soft	0.0 to 0.25
Soft	0.25 to 0.50
Medium	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	Over 4.0

Organic Content by Combustion Method

Soil Description	Loss on Ignition
Non Organic	Less than 4%
Organic Silt/Clay	4 – 12%
Sedimentary Peat	12% - 50%
Fibrous and Woody Peat	More than 50%

Plasticity

Term	Plastic Index
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

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SYMBOLS

Drilling and Sampling

CS – Continuous Sampling
RC – Rock Coring: Size AW, BW, NW, 2"W
RQD – Rock Quality Designation
RB – Rock Bit/Roller Bit
FT – Fish Tail
DC – Drove Casing
C – Casing: Size 2 ½", NW, 4", HW
CW – Clear Water
DM – Drilling Mud
HSA – Hollow Stem Auger
FA – Flight Auger
HA – Hand Auger
COA – Clean-Out Auger
SS - 2" Dia. Split-Barrel Sample
2ST – 2" Dia. Thin-Walled Tube Sample
3ST – 3" Dia. Thin-Walled Tube Sample
PT – 3" Dia. Piston Tube Sample
AS – Auger Sample
WS – Wash Sample
PTS – Peat Sample
PS – Pitcher Sample
NR – No Recovery
S – Sounding
PMT – Borehole Pressuremeter Test
VS – Vane Shear Test
WPT – Water Pressure Test

Laboratory Tests

q_a – Penetrometer Reading, tons/sq ft
q_a – Unconfined Strength, tons/sq ft
W – Moisture Content, %
LL – Liquid Limit, %
PL – Plastic Limit, %
SL – Shrinkage Limit, %
LI – Loss on Ignition
D – Dry Unit Weight, lbs/cu ft
pH – Measure of Soil Alkalinity or Acidity
FS – Free Swell, %

Water Level Measurement

▽ - Water Level at Time Shown
NW – No Water Encountered
WD – While Drilling
BCR – Before Casing Removal
ACR – After Casing Removal
CW – Cave and Wet
CM – Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

CGC, Inc.

Madison - Milwaukee

Unified Soil Classification System

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)		
		GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)		
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)		
		SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)		
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

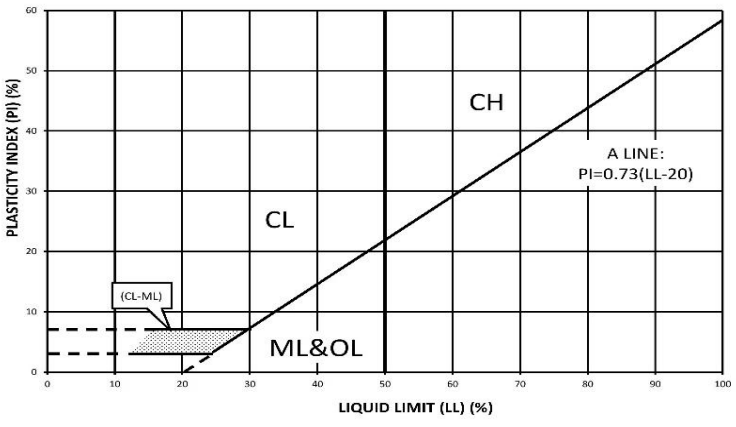
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limts below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limts above "A" line or P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ..... GW, GP, SW, SP
More than 12 percent ..... GM, GC, SM, SC
5 to 12 percent ..... Borderline cases requiring dual symbols

PLASTICITY CHART



APPENDIX C

DOCUMENT QUALIFICATIONS

APPENDIX C
DOCUMENT QUALIFICATIONS

I. GENERAL RECOMMENDATIONS/LIMITATIONS

CGC, Inc. should be provided the opportunity for a general review of the final design and specifications to confirm that earthwork and foundation requirements have been properly interpreted in the design and specifications. CGC should be retained to provide soil engineering services during excavation and subgrade preparation. This will allow us to observe that construction proceeds in compliance with the design concepts, specifications and recommendations, and also will allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction. CGC does not assume responsibility for compliance with the recommendations in this report unless we are retained to provide construction testing and observation services.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and no other warranties are expressed or implied. The opinions and recommendations submitted in this report are based on interpretation of the subsurface information revealed by the test borings indicated on the location plan. The report does not reflect potential variations in subsurface conditions between or beyond these borings. Therefore, variations in soil conditions can be expected between the boring locations and fluctuations of groundwater levels may occur with time. The nature and extent of the variations may not become evident until construction.

II. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes. While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

READ THE FULL REPORT

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *CGC cannot accept responsibility or liability for problems that occur because our reports do not consider developments of which we were not informed.*

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINION

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most

effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the confirmation-dependent recommendations included in your report. *Those confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *CGC cannot assume responsibility or liability for the report's confirmation-dependent recommendations if we do not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical engineering report. Confront that risk by having CGC participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

DO NOT REDRAW THE ENGINEER'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

GIVE CONSTRUCTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and constructors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineer's responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

ENVIRONMENTAL CONCERNS ARE NOT COVERED

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

OBTAIN PROFESSIONAL ASSISTANCE TO DEAL WITH MOLD

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

RELY ON YOUR GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Membership in the Geotechnical Business Council (GBC) of Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with CGC, a member of GBC, for more information.

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Geotechnical Business Council
of the Geoprofessional Business Association
8811 Colesville Road, Suite G 106
Silver Spring, MD 20910

APPENDIX D

RECOMMENDED COMPACTED FILL SPECIFICATIONS

APPENDIX D

CGC, INC.

RECOMMENDED COMPACTED FILL SPECIFICATIONS

General Fill Materials

Proposed fill shall contain no vegetation, roots, topsoil, peat, ash, wood or any other non-soil material which by decomposition might cause settlement. Also, fill shall never be placed while frozen or on frozen surfaces. Rock, stone or broken concrete greater than 6 in. in the largest dimension shall not be placed within 10 ft of the building area. Fill used greater than 10 ft beyond the building limits shall not contain rock, boulders or concrete pieces greater than a 2 sq ft area and shall not be placed within the final 2 ft of finish subgrade or in designated utility construction areas. Fill containing rock, boulders or concrete pieces should include sufficient finer material to fill voids among the larger fragments.

Special Fill Materials

In certain cases, special fill materials may be required for specific purposes, such as stabilizing subgrades, backfilling undercut excavations or filling behind retaining walls. For reference, WisDOT gradation specifications for various types of granular fill are attached in Table 1.

Placement Method

The approved fill shall be placed, spread and leveled in layers generally not exceeding 10 in. in thickness before compaction. The fill shall be placed at moisture content capable of achieving the desired compaction level. For clay soils or granular soils containing an appreciable amount of cohesive fines, moisture conditioning will likely be required.

It is the Contractor's responsibility to provide all necessary compaction equipment and other grading equipment that may be required to attain the specified compaction. Hand-guided vibratory or tamping compactors will be required whenever fill is placed adjacent to walls, footings, columns or in confined areas.

Compaction Specifications

Maximum dry density and optimum moisture content of the fill soil shall be determined in accordance with modified Proctor methods (ASTM D1557). The recommended field compaction as a percentage of the maximum dry density is shown in Table 2. Note that these compaction guidelines would generally not apply to coarse gravel/stone fill. Instead, a method specification would apply (e.g., compact in thin lifts with a vibratory compactor until no further consolidation is evident).

Testing Procedures

Representative samples of proposed fill shall be submitted to CGC, Inc. for optimum moisture-maximum density determination (ASTM D1557) prior to the start of fill placement. The sample size should be approximately 50 lb.

CGC, Inc. shall be retained to perform field density tests to determine the level of compaction being achieved in the fill. The tests shall generally be conducted on each lift at the beginning of fill placement and at a frequency mutually agreed upon by the project team for the remainder of the project.

Table 1
Gradation of Special Fill Materials

Material	WisDOT Section 311	WisDOT Section 312	WisDOT Section 305			WisDOT Section 209		WisDOT Section 210
	Breaker Run	Select Crushed Material	3-in. Dense Graded Base	1 1/4-in. Dense Graded Base	3/4-in. Dense Graded Base	Grade 1 Granular Backfill	Grade 2 Granular Backfill	Structure Backfill
Sieve Size	Percent Passing by Weight							
6 in.	100							
5 in.		90-100						
3 in.			90-100					100
1 1/2 in.		20-50	60-85					
1 1/4 in.				95-100				
1 in.					100			
3/4 in.			40-65	70-93	95-100			
3/8 in.				42-80	50-90			
No. 4			15-40	25-63	35-70	100 (2)	100 (2)	25-100
No. 10		0-10	10-30	16-48	15-55			
No. 40			5-20	8-28	10-35	75 (2)		
No. 100						15 (2)	30 (2)	
No. 200			2-12	2-12	5-15	8 (2)	15 (2)	15 (2)

Notes:

1. Reference: Wisconsin Department of Transportation *Standard Specifications for Highway and Structure Construction.*
2. Percentage applies to the material passing the No. 4 sieve, not the entire sample.
3. Per WisDOT specifications, both breaker run and select crushed material can include concrete that is 'substantially free of steel, building materials and other deleterious material'.

Table 2
Compaction Guidelines

Area	Percent Compaction (1)	
	Clay/Silt	Sand/Gravel
Within 10 ft of building lines		
Footing bearing soils	93 - 95	95
Under floors, steps and walks		
- Lightly loaded floor slab	90	90
- Heavily loaded floor slab and thicker fill zones	92	95
Beyond 10 ft of building lines		
Under walks and pavements		
- Less than 2 ft below subgrade	92	95
- Greater than 2 ft below subgrade	90	90
Landscaping	85	90

Notes:

1. Based on Modified Proctor Dry Density (ASTM D 1557)

APPENDIX E

WISCONSIN DEPARTMENT OF SAFETY & PROFESSIONAL SERVICES
SOIL AND SITE EVALUATION – STORM FORMS (13 BORINGS)

Division of Industry Services
P.O. Box 2658
Madison, Wisconsin 53701
Scott Walker, Governor
Laura Gutierrez, Secretary

Attachment 2:

SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road	County: Dane
	Parcel I.D.: 251/0710-063-1507-4
Please print all information	Reviewed by:
Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	Date:

Property Owner: City of Madison Motor Equipment			Property Location: Govt. Lot ¼ ¼ S T N R E (or) W
Property Owner's Mail Address: 200 North First Street		Lot #	Block# / Subd. Name or CSM #
City: Madison	State: WI / Zip Code: 53704 / Phone Number	[X] City [ ] Village [ ] Town: Madison	Nearest Road: 120 North First Street
Drainage area: _____ [ ] sq ft [ ] acres		Hydraulic Application Test Method	Soil Moisture: Date of soil borings: _____
Test site suitable for (check all that apply): [ ] Site not suitable;		[X] Morphological Evaluation	USDA-NRCS WETS Value: [ ] Dry = 1;
[ ] Bioretention; [ ] Subsurface Disperal System;		[ ] Double Ring Infiltrometer	[ ] Normal = 2;
[ ] Reuse; [ ] Irrigation; [ ] Other _____		[ ] Other: (specify) _____	[ ] Wet = 3.

B-1 #OBS. [ ] Pit [X] Boring Ground surface elevation 852.0 ft. Elevation of limiting factor 846.6 ft. (Poss. GW)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-4	Topsoil Fill (not sampled)								
2	4-60	10YR 2/2	none	SL (Fill)	1fsbk	mvfr		5-15		0.50 (1)
3	60-84	10YR 2/1	none	SiL/Peat	1fgr	mfi		<5		0.13 (2)
4	84-120	10YR 6/1, 6/2	none	FS	0sg	ml		<5		0.50

Comments: Groundwater was encountered at about 7 ft during drilling; cave-in at about 5.4 ft after the completion of drilling may indicate groundwater near that depth. (1) Infiltration rate of Horizon 2 (granular fill) should be considered very approximate. (2) Infiltration rate of Horizon 3 (peat) should be considered very approximate.

B-2 #OBS. [ ] Pit [X] Boring Ground surface elevation 851.0 ft. Elevation of limiting factor 847.0 ft. (Poss. GW) 845.5 ft. (Redox)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-18	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	18-66	10YR 6/4	none	GRSL (Fill)	1msbk	mfr		15-25		0.50 (1)
3	66-96	2.5Y 3/1, 2.5/1	c2d 7.5YR 4/6	SiL/Peat	1fabk	mfi		<5		0.13 (2)
4	96-120	2.5Y 5/1	none	S	0sg	ml		<5		3.60

Comments: Groundwater level was obscured by presence of probable perched water at about 3 ft; cave-in at about 4.0 ft after the completion of drilling may indicate groundwater near that depth. Redox in Horizon 3 indicates the level of past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater. (1) Infiltration rate of Horizon 2 (granular fill) should be considered very approximate. (2) Infiltration rate of Horizon 3 (peat) should be considered very approximate.

Name (Please Print): Tim F. Gassenheimer		Signature:		Credential Number: SP-011900004
Address: 129 Milky Way, Madison, WI 53718		Date Evaluation Conducted: June 12, 2019		Telephone Number: (608) 288-4100

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B-3 #OBS. [ ] Pit [X] Boring Ground surface elevation 851.5 ft. Elevation of limiting factor 846.5 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-11	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	11-60	Variable Fill (1)								
3	60-78	10YR 2/1	none	SiL/Peat	1fgr	mfi		<5		0.13 (2)
4	78-96	2.5Y 5/1	none	FS, SiL/ Peat Sms	0sg	ml		<5		0.13-0.50 (3)
5	96-126	2.5Y 5/1	none	FS	0sg	ml		<5		0.50
6	126-156	10YR 5/1	none	S	0sg	ml		<5		3.60
7	156-180	10YR 5/2	none	FS	0sg	ml		<5		0.50

Comments: Groundwater was encountered at about 8 ft during drilling and at about 5.0 ft after the completion of drilling. (1) Infiltration rate of Horizon 2 (mixed fill) should be expected to vary considerably. (2) Infiltration rate of Horizon 3 (peat) should be considered very approximate. (3) Infiltration potential of Horizon 4 may be limited by silt loam/peat seams. Infiltration rate can potentially be improved by deep-tilling or excavating/turning-over fine sand layer to disrupt silt loam/peat seams. Gradations should be collected during construction to check that the blended soil is consistent with the design infiltration rate.

B-5 #OBS. [ ] Pit [X] Boring Ground surface elevation 851.5 ft. Elevation of limiting factor 850.0 ft. (Low-chr./high-val. 844.7 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-9	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	9-18	10YR 6/4	none	GRSL (Fill)	1msbk	mfr		20-30		0.50 (1)
3	18-42	2.5Y 6/1	none	SiCL	0m	mfi		<5		0.04
4	42-72	10YR 2/1	none	SiL	1mabk	mfi		<5		0.13
5	72-96	2.5Y 5/1	none	FS	0sg	ml		<5		0.50
6	96-120	2.5Y 4/1, GLEY1 3/N	none	Stratified S and SiL	variable			<5		0.13 (2)

Comments: Groundwater was encountered at about 8 ft during drilling and at about 6.8 ft after the completion of drilling. Low-chroma/high-value dominant color in Horizon 3 indicates the level of past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater. (1) Infiltration rate of Horizon 2 (granular fill) should be considered very approximate. (2) Infiltration rate of Horizon 6 will be controlled by silt loam.

B-6 #OBS. [ ] Pit [X] Boring Ground surface elevation 851.0 ft. Elevation of limiting factor 845.0 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-15	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	15-60	Variable Fill (1)								
3	60-78	10YR 2/1	none	SiL/Peat	2mgr	mfi		<5		0.13 (2)
4	78-96	10YR 6/1	none	S	0sg	ml		<5		3.60
5	96-120	2.5Y 5/1	none	FS	0sg	ml		<5		0.50

Comments: Groundwater was encountered at about 8 ft during drilling and at about 6.0 ft after the completion of drilling. (1) Infiltration rate of Horizon 2 (mixed fill) should be expected to vary considerably. (2) Infiltration rate of Horizon 3 (peat) should be considered very approximate.

B-7 #OBS. [ ] Pit [X] Boring Ground surface elevation 851.5 ft. Elevation of limiting factor 843.7 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-11	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	11-36	10YR 5/6	none	SCL (Fill)	0m	mfi		5-15		0.11 (1)
3	36-66	10YR 2/2	none	SiL/Peat (Fill)	2mabk	mfi		<10		0.13 (2)
4	66-120	2.5Y 6/1	none	FS, SiL/ Peat Sms	0m	mfi		<1	4	0.13-0.50 (3)

Comments: Groundwater was encountered at about 8 ft during drilling and at about 7.8 ft after the completion of drilling. (1) Infiltration rate of Horizon 2 (cohesive fill) should be considered very approximate. (2) Infiltration rate of Horizon 3 (organic fill) should be considered very approximate. (3) Infiltration potential of Horizon 4 may be limited by silt loam/peat seams. Infiltration rate can potentially be improved by deep-tilling or excavating/turning-over fine sand layer to disrupt silt loam/peat seams. Gradations should be collected during construction to check that the blended soil is consistent with the design infiltration rate.

B-8 #OBS. [ ] Pit [X] Boring Ground surface elevation 852.0 ft. Elevation of limiting factor 844.0 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-12	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	12-48	Variable Fill (1)								
3	48-66	2.5Y 2.5/1	none	S (Fill)	0sg	ml		<5		3.60 (2)
4	66-84	10YR 2/1	none	SiL/Peat	2mgr	mfi		<5		0.13 (3)
5	84-102	2.5Y 6/1	none	FS	0sg	ml		<5		0.50
6	102-138	2.5Y 5/1, 5Y 4/1	none	S	0sg	ml		<5		3.60
7	138-162	10YR 5/1	none	SiL	1mabk	mfi		<5		0.13
8	162-180	10YR 5/1	none	SiCL	0m	mfi		<5		0.04

Comments: Groundwater was encountered at about 8.5 ft during drilling and at about 8.0 ft after the completion of drilling. (1) Infiltration rate of Horizon 2 (mixed fill) should be expected to vary considerably. (2) Infiltration rate of Horizon 3 (granular fill) should be considered very approximate. (3) Infiltration rate of Horizon 4 (peat) should be considered very approximate.

B-9 #OBS. [ ] Pit [X] Boring Ground surface elevation 851.5 ft. Elevation of limiting factor 844.5 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-8	Topsoil Fill (not sampled)								
2	8-66	Variable Fill (1)								
3	66-96	10YR 2/1	none	SiL/Peat	2mgr	mfi		<5		0.13 (2)
4	96-144	2.5Y 5/1, 5Y 4/1	none	S	0sg	ml		<5		3.60
5	144-180	2.5Y 5/1	none	Stratified FS + LFS	variable			<5		0.50

Comments: Groundwater was encountered at about 7 ft during drilling. (1) Infiltration rate of Horizon 2 (mixed fill) should be expected to vary considerably. (2) Infiltration rate of Horizon 3 (peat) should be considered very approximate.

B-10 #OBS. [ ] Pit [X] Boring Ground surface elevation 851.0 ft. Elevation of limiting factor 845.7 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-13	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	13-36	10YR 6/3	none	FS (Fill)	0sg	ml		<5		0.50 (1)
3	36-66	Variable Fill (2)								
4	66-84	2.5Y 2.5/1	none	L-FSL/ Peat	1fgr	mfi		<5		0.24-0.50 (3)
5	84-102	2.5Y 5/1	none	LFS, SiL/ Peat Sms	1fsbk	mfr		<5		0.13-0.50 (4)
6	102-120	2.5Y 5/1	none	FS	0sg	ml		<5		0.50

Comments: Groundwater was encountered at about 8.5 ft during drilling and at about 5.3 ft after the completion of drilling. (1) Infiltration rate of Horizon 2 (granular fill) should be considered very approximate. (2) Infiltration rate of Horizon 3 (mixed fill) should be expected to vary considerably. (3) Infiltration rate of Horizon 4 (peat) should be considered very approximate. (4) Infiltration potential of Horizon 5 may be limited by silt loam/peat seams. Infiltration rate can potentially be improved by deep-tilling or excavating/turning-over loamy fine sand layer to disrupt silt loam/peat seams. Gradations should be collected during construction to check that the blended soil is consistent with the design infiltration rate.

B-11 #OBS. [ ] Pit [X] Boring Ground surface elevation 852.0 ft. Elevation of limiting factor 846.0 ft. (Poss. GW)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-15	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	15-36	Variable Fill (1)								
3	36-72	10YR 5/4	none	SL (Fill)	1fsbk	mfr		<10		0.50 (2)
4	72-90	Variable Fill (1)								
5	90-114	10YR 2/1	none	SiL/Peat	2mgr	mfi		<5		0.13 (3)
6	114-132	2.5Y 6/1	none	FS	0sg	ml		<5		0.50
7	132-156	2.5Y 6/1	none	S	0sg	ml		<5		3.60
8	156-180	2.5Y 6/1	none	SiL-L	2mabk	mfi		<5		0.13-0.24

Comments: Groundwater or possible perched water was encountered at about 6 ft during drilling. (1) Infiltration rate of Horizons 2 and 4 (mixed fill) should be expected to vary considerably. (2) Infiltration rate of Horizon 3 (granular fill) should be considered very approximate. (3) Infiltration rate of Horizon 5 (peat) should be considered very approximate.

B-12 #OBS. [ ] Pit [X] Boring Ground surface elevation 852.0 ft. Elevation of limiting factor 846.5 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-11	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	11-66	Variable Fill (1)								
3	66-120	2.5Y 6/1	none	S	0sg	ml		<5		3.60

Comments: Groundwater was encountered at about 5.5 ft during drilling and at about 6.0 ft after the completion of drilling. (1) Infiltration rate of Horizon 2 (mixed fill) should be expected to vary considerably.

B-13 #OBS. [ ] Pit [X] Boring Ground surface elevation 852.0 ft. Elevation of limiting factor 846.0 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-12	Asphalt Pavement and Aggregate Base Course (not sampled)								
2	12-36	10YR 4/2	none	SL (Fill)	1fsbk	mvfr		5-15		0.50 (1)
3	36-60	Variable Fill (2)								
4	60-78	2.5Y 6/1, 4/1, 2.5/1	none	Strat. FS, SiL+SiL/Peat	variable			<5		0.13 (3)
5	78-96	10YR 2/1	none	SiL/Peat	1fgr	mfi		<5		0.13 (4)
6	96-126	2.5Y 5/1	none	FS	0sg	ml		<5		0.50
7	126-180	10YR 5/1	none	FS	0sg	ml		<1	15	0.50

Comments: Groundwater was encountered at about 8 ft during drilling; groundwater level in monitoring well was observed at about 6.0 ft on July 3, 2019. (1) Infiltration rate of Horizon 2 (granular fill) should be considered very approximate. (2) Infiltration rate of Horizon 3 (mixed fill) should be expected to vary considerably. (3) Infiltration rate of Horizon 4 will be controlled by peat and should be considered very approximate. (4) Infiltration rate of Horizon 5 (peat) should be considered very approximate.

Overall Site Comments: See Comments above and Preliminary Stormwater Infiltration Potential section in Geotechnical Exploration Report.

Division of Industry Services
P.O. Box 2658
Madison, Wisconsin 53701
Scott Walker, Governor
Laura Gutierrez, Secretary

Attachment 2:

SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road	County: Dane
	Parcel I.D.: 251/0710-063-1509-0
Please print all information	Reviewed by:
Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	Date:

Property Owner: City of Madison Motor Equipment			Property Location: Govt. Lot ¼ ¼ S T N R E (or) W
Property Owner's Mail Address: 200 North First Street		Lot #	Block# / Subd. Name or CSM #
City: Madison	State: WI / Zip Code: 53704 / Phone Number	[X] City [ ] Village [ ] Town: Madison	Nearest Road: 212 North First Street
Drainage area: ____ [ ] sq ft [ ] acres		Hydraulic Application Test Method	Soil Moisture: Date of soil borings: ____
Test site suitable for (check all that apply): [ ] Site not suitable;		[X] Morphological Evaluation	USDA-NRCS WETS Value: [ ] Dry = 1;
[ ] Bioretention; [ ] Subsurface Disperal System;		[ ] Double Ring Infiltrometer	[ ] Normal = 2;
[ ] Reuse; [ ] Irrigation; [ ] Other ____		[ ] Other: (specify) ____	[ ] Wet = 3.

B-4 #OBS. [ ] Pit [X] Boring Ground surface elevation 852.0 ft. Elevation of limiting factor 844.4 ft. (Groundwater)

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-4	Topsoil Fill (not sampled)								
2	4-36	Variable Fill [1]								
3	36-66	10YR 5/4	none	FS-LFS (Fill)	0sg	ml		<5		0.50 [2]
4	66-96	10YR 2/1	none	SiL/Peat	1fgr	mfi		<5		0.13 [3]
5	96-126	2.5Y 7/1, 10YR 6/1	none	S	0sg	ml		<5		3.60
6	126-156	2.5Y 5/1, 10YR 5/3	none	S	0sg	ml		<5		3.60
7	156-180	2.5Y 5/1, 10YR 6/1	none	FS	0sg	ml		<5		0.50

Comments: Groundwater was encountered at about 8 ft during drilling and at about 7.6 ft after the completion of drilling. [1] Infiltration rate of Horizon 2 (mixed fill) should be expected to vary considerably. [2] Infiltration rate of Horizon 3 (granular fill) should be considered very approximate. [3] Infiltration rate of Horizon 3 (peat) should be considered very approximate.

Overall Site Comments: See Comments above and Preliminary Stormwater Infiltration Potential section in Geotechnical Exploration Report.

Name (Please Print): Tim F. Gassenheimer		Signature:		Credential Number: SP-011900004
Address: 129 Milky Way, Madison, WI 53718			Date Evaluation Conducted: June 12, 2019	Telephone Number: (608) 288-4100

8595

3.3 WDNR Contamination Case Closure Report

GIS REGISTRY
Cover Sheet

August 2011
(RR-5367)

Source Property Information

CLOSURE DATE: Apr 2, 2012

BRRTS #: **03-13-000438**

FID #:

ACTIVITY NAME: FIRST ST GARAGE

DATCP #:

PROPERTY ADDRESS: 200 N First St

PECFA#: 53704470500A

MUNICIPALITY: Madison

PARCEL ID #: 251-0710-063-1507-4

***WTM COORDINATES:**

X: **571897** Y: **291370**

** Coordinates are in WTM83, NAD83 (1991)*

WTM COORDINATES REPRESENT:

- (•) Approximate Center Of Contaminant Source
- ( ) Approximate Source Parcel Center

Please check as appropriate: (BRRTS Action Code)

Contaminated Media:

- [X] Groundwater Contamination > ES *(236)*
  - [ ] Contamination in ROW
  - [ ] Off-Source Contamination

  (***note:*** *for list of off-source properties see "Impacted Off-Source Property" form)*
- [X] Soil Contamination > *RCL or **SSRCL *(232)*
  - [ ] Contamination in ROW
  - [ ] Off-Source Contamination

  (***note:*** *for list of off-source properties see "Impacted Off-Source Property" form)*

Land Use Controls:

- [ ] N/A (*Not Applicable*)
- [ ] Soil: maintain industrial zoning *(220)*

  (***note:*** *soil contamination concentrations between non-industrial and industrial levels)*
- [ ] Structural Impediment *(224)*
- [ ] Site Specific Condition *(228)*
- [X] Cover or Barrier *(222)*

  (***note:*** *maintenance plan for groundwater or direct contact)*
- [ ] Vapor Mitigation *(226)*
- [ ] Maintain Liability Exemption *(230)*

  (***note:*** *local government unit or economic development corporation was directed to take a response action)*

Monitoring Wells:

Are all monitoring wells properly abandoned per NR 141? *(234)*

(•) Yes ( ) No ( ) N/A

** Residual Contaminant Level*
***Site Specific Residual Contaminant Level*

This Adobe Fillable form is intended to provide a list of information that is required for evaluation for case closure. It is to be used in conjunction with Form 4400-202, Case Closure Request. The closure of a case means that the Department has determined that no further response is required at that time based on the information that has been submitted to the Department.

NOTICE: Completion of this form is mandatory for applications for case closure pursuant to ch. 292, Wis. Stats. and ch. NR 726, Wis. Adm. Code, including cases closed under ch. NR 746 and ch. NR 726. The Department will not consider, or act upon your application, unless all applicable sections are completed on this form and the closure fee and any other applicable fees, required under ch. NR 749, Wis. Adm. Code, Table 1 are included. It is not the Department's intention to use any personally identifiable information from this form for any purpose other than reviewing closure requests and determining the need for additional response action. The Department may provide this information to requesters as required by Wisconsin's Open Records law [ss. 19.31 - 19.39, Wis. Stats.].

BRRTS #: 03-13-000438 Parcel ID #: 251/0710-063-1507-4

ACTIVITY NAME: First Street Garage WTM COORDINATES: X: 571897 Y: 291370

CLOSURE DOCUMENTS (the Department add these items to the final GIS packet for posting on the Registry)

__X__ **Closure Letter**

__X__ **Maintenance Plan** (*if activity is closed with a land use limitation or condition (land use control) under s. 292.12, Wis. Stats.*)

__X__ **Conditional Closure Letter**

____ **Certificate of Completion (COC)** for VPLE sites

SOURCE LEGAL DOCUMENTS

__X__ **Deed:** The most recent deed as well as legal descriptions, for the **Source Property** (where the contamination originated). Deeds for other, off-source (off-site) properties are located in the **Notification** section. ***Note:*** *If a property has been purchased with a land contract and the purchaser has not yet received a deed, a copy of the land contract which includes the legal description shall be submitted instead of the most recent deed. If the property has been inherited, written documentation of the property transfer should be submitted along with the most recent deed.*

__X__ **Certified Survey Map:** A copy of the certified survey map or the relevant section of the recorded plat map *for those properties where the legal description in the most recent deed refers to a certified survey map or a recorded plat map.* (lots on subdivided or platted property (e.g. lot 2 of xyz subdivision)).

Figure #: **Title:**

__X__ **Signed Statement:** A statement signed by the Responsible Party (RP), which states that he or she believes that the attached legal description accurately describes the correct contaminated property.

MAPS (meeting the visual aid requirements of s. NR 716.15(2)(h)

Maps must be no larger that 8.5 X 14 inches unless the map is submitted electronically.

__X__ **Location Map:** A map outlining all properties within the contaminated site boundaries on a U.S.G.S. topographic map or plat map in sufficient detail to permit easy location of all parcels. If groundwater standards are exceeded, include the location of all potable wells within 1200 feet of the site.
Note: *Due to security reasons municipal wells are not identified on GIS Packet maps. However, the locations of these municipal wells must be identified on Case Closure Request maps.*

Figure #: **Title: Site Location Map**

__X__ **Detailed Site Map:** A map that shows all relevant features (buildings, roads, individual property boundaries, contaminant sources, utility lines, monitoring wells and potable wells) within the contaminated area. This map is to show the location of all contaminated public streets, and highway and railroad rights-of-way in relation to the source property and in relation to the boundaries of groundwater contamination exceeding a ch. NR 140 Enforcement Standard (ES), and/or in relation to the boundaries of soil contamination exceeding a Residual Contaminant Level (RCL) or a Site Specific Residual Contaminant Levels (SSRCL) as determined under s. NR 720.09, 720.11 and 720.19.

Figure #: **Title: Site Layout Map and Site Plan**

__X__ **Soil Contamination Contour Map:** For sites closing with residual soil contamination, this map is to show the location of all contaminated soil and a single contour showing the horizontal extent of each area of contiguous residual soil contamination that exceeds a Residual Contaminant Level (RCL) or a Site Specific Residual Contaminant Level (SSRCL)as determined under s. NR 720.09, 720.11 and 720.19.

Figure #: **Title: Soil Contamination Map (December 12, 2007)**

BRRTS #: 03-13-000438 ACTIVITY NAME: First Street Garage

MAPS (continued)

_X_ **Geologic Cross-Section Map:** A map showing the source location and vertical extent of residual soil contamination exceeding a Residual Contaminant Level (RCL) or a Site Specific Residual Contaminant Level (SSRCL). If groundwater contamination exceeds a ch. NR 140 Enforcement Standard (ES) when closure is requested, show the source location and vertical extent, water table and piezometric elevations, and locations and elevations of geologic units, bedrock and confining units, if any.

Figure #: **Title: Geologic Cross Section A-A'**

Figure #: **Title: Geologic Cross Section B-B'**

_X_ **Groundwater Isoconcentration Map:** For sites closing with residual groundwater contamination, this map shows the horizontal extent of all groundwater contamination exceeding a ch. NR140 Preventive Action Limit (PAL) and an Enforcement Standard (ES). Indicate the direction and date of groundwater flow, based on the most recent sampling data. Note: This is intended to show the total area of contaminated groundwater.

Figure #: **Title: Groundwater Contamination Map (December 12, 2007)**

_X_ **Groundwater Flow Direction Map:** A map that represents groundwater movement at the site. If the flow direction varies by more then 20° over the history of the site, submit 2 groundwater flow maps showing the maximum variation in flow direction.

Figure #: **Title: Groundwater Contour Map (December 12, 2007)**

Figure #: **Title: Water Table (May 16, 1992)**

TABLES (meeting the requirements of s. NR 716.15(2)(h)

Tables must be no larger than 8.5 x 14 inches unless the table is submitted electronically. Tables must not contain shading and/or cross-hatching. The use of **BOLD** or *ITALICS* is acceptable.

_X_ **Soil Analytical Table**: A table showing remaining soil contamination with analytical results and collection dates. Note: This is one table of results for the contaminants of concern. Contaminants of concern are those that were found during the site investigation, that remain after remediation. It may be necessary to create a new table to meet this requirement.

Figure #: **Title:**

_X_ **Groundwater Analytical Table:** Table(s) that show the most recent analytical results and collection dates, for all monitoring wells and any potable wells for which samples have been collected.

Figure #: **Title: Groundwater Analytical Results Summary**

_X_ **Water Level Elevations:** Table(s) that show the previous four (at minimum) water level elevation measurements/dates from all monitoring wells. If present, free product is to be noted on the table.

Figure #: **Title: Watertable Elevation Table**

IMPROPERLY ABANDONED MONITORING WELLS

For each monitoring well not properly abandoned according to requirements of s. NR 141.25 include the following documents.
Note: *If the site is being listed on the GIS Registry for only an improperly abandoned monitoring well you will only need to submit the documents in this section for the GIS Registry Packet.*

_X_ **Not Applicable**

_____ **Site Location Map:** A map showing all surveyed monitoring wells with specific identification of the monitoring wells which have not been properly abandoned.
Note: If the applicable monitoring wells are distinctly identified on the Detailed Site Map this Site Location Map is not needed.

Figure #: **Title:**

_____ **Well Construction Report:** Form 4440-113A for the applicable monitoring wells.

_____ **Deed:** The most recent deed as well as legal descriptions for each property where a monitoring well was not properly abandoned.

_____ **Notification Letter:** Copy of the notification letter to the affected property owner(s).

BRRTS #: 03-13-000438 ACTIVITY NAME: First Street Garage

NOTIFICATIONS

Source Property

_____ **Letter To Current Source Property Owner:** If the source property is owned by someone other than the person who is applying for case closure, include a copy of the letter notifying the current owner of the source property that case closure has been requested.

_____ **Return Receipt/Signature Confirmation:** Written proof of date on which confirmation was received for notifying current source property owner.

Off-Source Property

Group the following information per individual property and label each group according to alphabetic listing on the "Impacted Off-Source Property" attachment.

___ **Letter To "Off-Source" Property Owners:** Copies of all letters sent by the Responsible Party (RP) to owners of properties with groundwater exceeding an Enforcement Standard (ES), and to owners of properties that will be affected by a land use control under s. 292.12, Wis. Stats.
Note: *Letters sent to off-source properties regarding residual contamination must contain standard provisions in Appendix A of ch. NR 726.*

Number of "Off-Source" Letters:

___ **Return Receipt/Signature Confirmation:** Written proof of date on which confirmation was received for notifying any off-source property owner.

___ **Deed of "Off-Source" Property:** The most recent deed(s) as well as legal descriptions, for all affected deeded **off-source property(ies).** This does not apply to right-of-ways.
Note: *If a property has been purchased with a land contract and the purchaser has not yet received a deed, a copy of the land contract which includes the legal description shall be submitted instead of the most recent deed. If the property has been inherited, written documentation of the property transfer should be submitted along with the most recent deed.*

_____ **Letter To "Governmental Unit/Right-Of-Way" Owners:** Copies of all letters sent by the Responsible Party (RP) to a city, village, municipality, state agency or any other entity responsible for maintenance of a public street, highway, or railroad right-of-way, within or partially within the contaminated area, for contamination exceeding a groundwater Enforcement Standard (ES) and/or soil exceeding a Residual Contaminant Level (RCL) or a Site Specific Residual Contaminant Level (SSRCL).

Number of "Governmental Unit/Right-Of-Way Owner" Letters:

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

April 2, 2012

File Ref.: 03-13-000438

Brynn Bemis
City of Madison
1600 Emil Street
Madison WI 53713

KEEP THIS DOCUMENT WITH YOUR PROPERTY RECORDS

SUBJECT: Final Case Closure with Continuing Obligations
First Street Garage, 200 North First Street, Madison, WI
WDNR BRRTS Activity #: 03-13-000438

Dear Mr. Bemis:

The Department of Natural Resources (DNR) considers First Street Garage closed, with continuing obligations. No further investigation or remediation is required at this time. However, you and future property owners must comply with the continuing obligations as explained in the conditions of closure in this letter. Please read over this letter closely to ensure that you comply with all conditions and other on-going requirements. Provide this letter and any attached maintenance plan to anyone who purchases this property from you.

This final closure decision is based on the correspondence and data provided, and is issued under ch. NR 726, Wisconsin Administrative Code. The South Central Closure Committee reviewed your request for closure on June 7, 2011. The Closure Committee reviews environmental remediation cases for compliance with state laws and standards to maintain consistency in the closure of these cases. A conditional closure letter was issued by the DNR on July 18, 2011, and documentation that the conditions in that letter were met was received on September 6, 2011.

The site has been operated as a fuel and maintenance facility since 1945. Contaminated soil and groundwater at the site were remediated by soil vapor extraction and groundwater extraction. The conditions of closure and continuing obligations required were based on the property being used for commercial purposes.

Continuing Obligations

The continuing obligations for this site are summarized below. Further details on actions required are found in the section Closure Conditions.

- Groundwater contamination is present above ch. NR 140, Wis. Adm. Code enforcement standards.
- Residual soil contamination exists that must be properly managed should it be excavated or removed.
- If a structural impediment that obstructed a complete site investigation or cleanup is removed or modified, additional environmental work must be completed.
-Pavement, an engineered cover or a soil barrier must be maintained over contaminated soil and the DNR must approve any changes to this barrier.

GIS Registry

This site will be listed on the Remediation and Redevelopment Program's internet accessible Geographic Information System (GIS) Registry, to provide notice of residual contamination and of any continuing obligations. DNR approval prior to well construction or reconstruction is required for all sites shown on the GIS Registry, in accordance with s. NR 812.09(4) (w), Wis. Adm. Code. To obtain approval, complete and submit Form 3300-254 to the DNR Drinking and Groundwater program's regional water supply specialist. This form can be obtained on-line at http://dnr.wi.gov/org/water/dwg/3300254.pdf or at the web address listed below for the GIS Registry.

All site information is also on file at the South Central Regional DNR office, at 3911 Fish Hatchery Road in Fitchburg. This letter and information that was submitted with your closure request application, including the maintenance plan, will be included on the GIS Registry in a PDF attachment. To review the site on the GIS Registry web page, visit the RR Sites Map page at http://dnr.wi.gov/org/aw/rr/gis/index.htm.

Prohibited Activities

Certain activities are prohibited at closed sites because maintenance of a barrier is intended to prevent contact with any remaining contamination. When a barrier is required, the condition of closure requires notification of the DNR before making a change, in order to determine if further action is needed to maintain the protectiveness of the remedy employed. The following activities are prohibited on any portion of the property where pavement is required, as shown on the **attached map**, unless prior written approval has been obtained from the DNR:

- removal of the existing barrier;
- replacement with another barrier;
- excavating or grading of the land surface;
- filling on covered or paved areas;
- plowing for agricultural cultivation;
- construction or placement of a building or other structure;
- changing the use or occupancy of the property to a residential exposure setting, which may include certain uses, such as single or multiple family residences, a school, day care, senior center, hospital, or similar residential exposure settings;

Closure Conditions

Compliance with the requirements of this letter is a responsibility to which the current property owner, and any subsequent property owners must adhere. DNR staff will conduct periodic prearranged inspections to ensure that the conditions included in this letter and the attached maintenance plans are met. If these requirements are not followed, the DNR may take enforcement action under s. 292.11, Wisconsin Statutes to ensure compliance with the specified requirements, limitations or other conditions related to the property.

Residual Groundwater Contamination (ch. NR 140, 812, Wis. Adm. Code)
Groundwater contamination greater than enforcement standards is present on this contaminated property, as shown on the **attached map**. If you intend to construct a new well, or reconstruct an existing well, you'll need prior DNR approval.

Residual Soil Contamination (ch. NR 718, chs. 500 to 536, Wis. Adm. Code or ch. 289, Wis. Stats.)
Soil contamination remains as indicated on the **attached map**. If soil in the specific locations described above is excavated in the future, the property owner at the time of excavation must sample and analyze the excavated soil to determine if contamination remains. If sampling confirms that contamination is present, the property owner at the time of excavation will need to determine whether the material is considered solid or hazardous waste and ensure that any storage, treatment or disposal is in compliance with applicable standards and rules. In addition, all

current and future owners and occupants of the property need to be aware that excavation of the contaminated soil may pose an inhalation or other direct contact hazard and as a result special precautions may need to be taken to prevent a direct contact health threat to humans.

The pavement, building or other impervious cover that exists in the location shown on the **attached map** shall be maintained in compliance with the **attached maintenance plan** in order to minimize the infiltration of water and prevent additional groundwater contamination that would violate the groundwater quality standards in ch. NR 140, Wis. Adm. Code, and to prevent direct contact with residual soil contamination that might otherwise pose a threat to human health. In this case, the building is also considered a structural impediment, and additional investigation and response requirements apply as described in the section titled Structural Impediments.

A cover or barrier for industrial land uses, or certain types of commercial land uses may not be protective if use of the property were to change such that a residential exposure would apply. This may include, but is not limited to single or multiple family residences, a school, day care, senior center, hospital or similar settings. Before using the property for such purposes, you must notify the DNR to determine if additional response actions are warranted.

A request may be made to modify or replace a cover or barrier. The replacement or modified cover or barrier must be protective of the revised use of the property, and must be approved in writing by the DNR prior to implementation.

The **attached maintenance plan and inspection log** are to be kept up-to-date and on-site. Submit the inspection log to the DNR only upon request.

Structural Impediments (s. 292.12 (2) (b), Wis. Stats.)
The remaining building as shown on the **attached map**, made complete investigation and/or remediation of the soil contamination on this property impracticable. If the structural impediment is to be removed, the property owner shall notify the DNR before removal and conduct an investigation of the degree and extent of petroleum contamination below the structural impediment. If contamination is found at that time, the contamination shall be properly remediated in accordance with applicable statutes and rules.

PECFA Reimbursement

Section 101.143, Wis. Stats., requires that Petroleum Environmental Cleanup Fund Award (PECFA) claimants seeking reimbursement of interest costs, for sites with petroleum contamination, submit a final reimbursement claim within 120 days after they receive a closure letter on their site. For claims not received by the PECFA Program within 120 days of the date of this letter, interest costs after 60 days of the date of this letter will not be eligible for PECFA reimbursement. If there is equipment purchased with PECFA funds remaining at the site, contact the Department of Safety and Professional Services PECFA Program to determine the method for salvaging the equipment.

The following DNR fact sheet, "Continuing Obligations for Environmental Protection", RR-819, was included with this letter, to help explain a property owner's responsibility for continuing obligations on their property. If the fact sheet is lost, you may obtain a copy at http://dnr.wi.gov/org/aw/rr/archives/pubs/RR819.pdf.

Please send written notifications in accordance with the above requirements to the Remediation and Redevelopment program at the above address, to the attention of the Environmental Program Assistant.

Please be aware that the case may be reopened pursuant to s. NR 726.09, Wis. Adm. Code, if additional information regarding site conditions indicates that contamination on or from the site poses a threat to public

health, safety, or welfare or to the environment.

The DNR appreciates your efforts to restore the environment at this site. If you have any questions regarding this closure decision or anything outlined in this letter, please contact Larry Lester at 608-275-3465.

Sincerely,

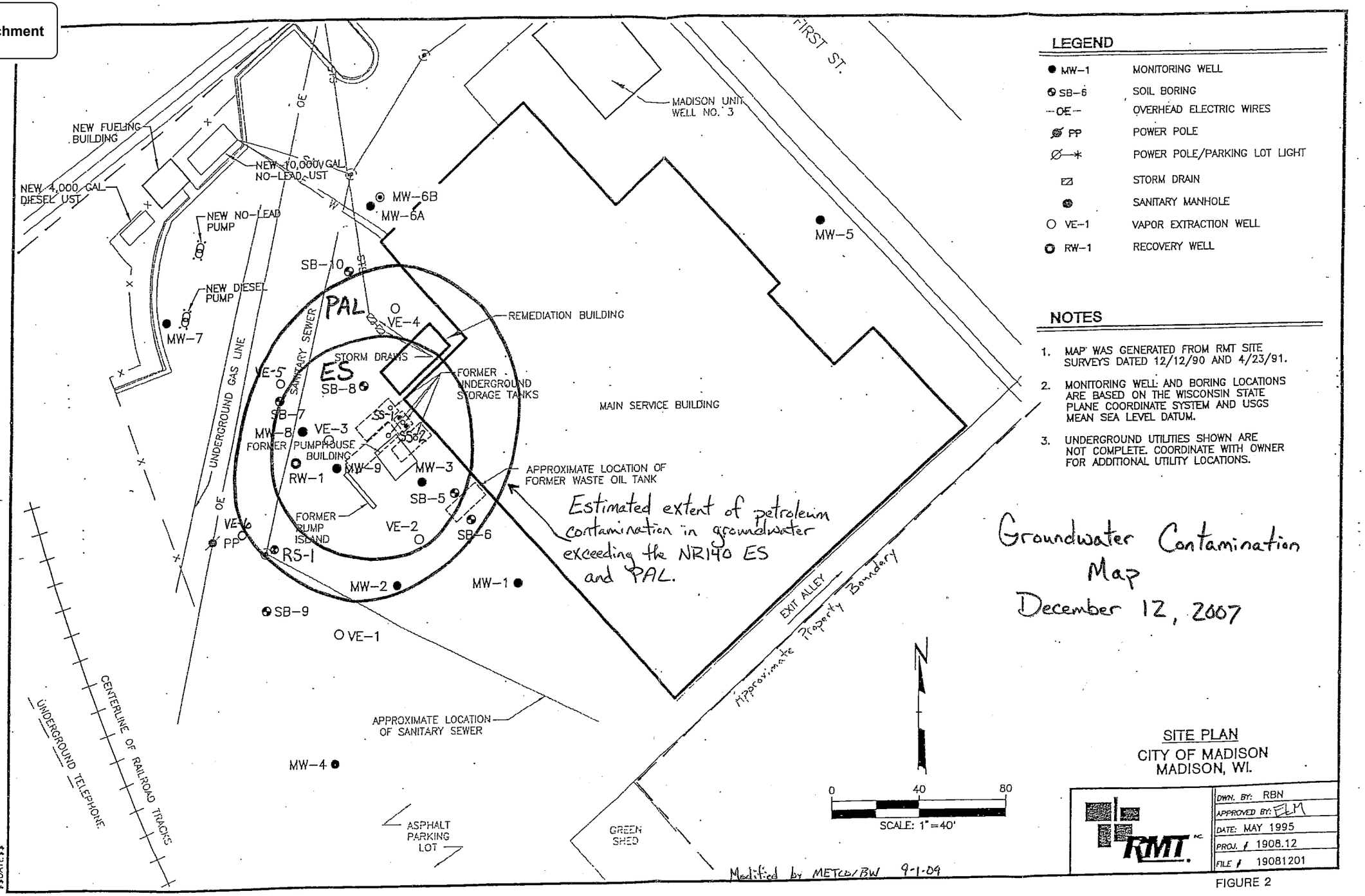
Linda Hanefeld, Team Supervisor
South Central Region Remediation & Redevelopment Program

Attachments:

- remaining groundwater contamination map
- remaining soil contamination map
- extent of cap map
- maintenance plan
- RR 819

cc: Powell, METCO
Heberer, WDSPS

Attachment



LEGEND

● MW-1	MONITORING WELL
⊕ SB-6	SOIL BORING
--OE--	OVERHEAD ELECTRIC WIRES
PP	POWER POLE
	POWER POLE/PARKING LOT LIGHT
	STORM DRAIN
	SANITARY MANHOLE
○ VE-1	VAPOR EXTRACTION WELL
◎ RW-1	RECOVERY WELL

NOTES

1. MAP WAS GENERATED FROM RMT SITE SURVEYS DATED 12/12/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND USGS MEAN SEA LEVEL DATUM.
3. UNDERGROUND UTILITIES SHOWN ARE NOT COMPLETE. COORDINATE WITH OWNER FOR ADDITIONAL UTILITY LOCATIONS.

Groundwater Contamination Map
December 12, 2007

SITE PLAN
CITY OF MADISON
MADISON, WI.

RMT, INC.

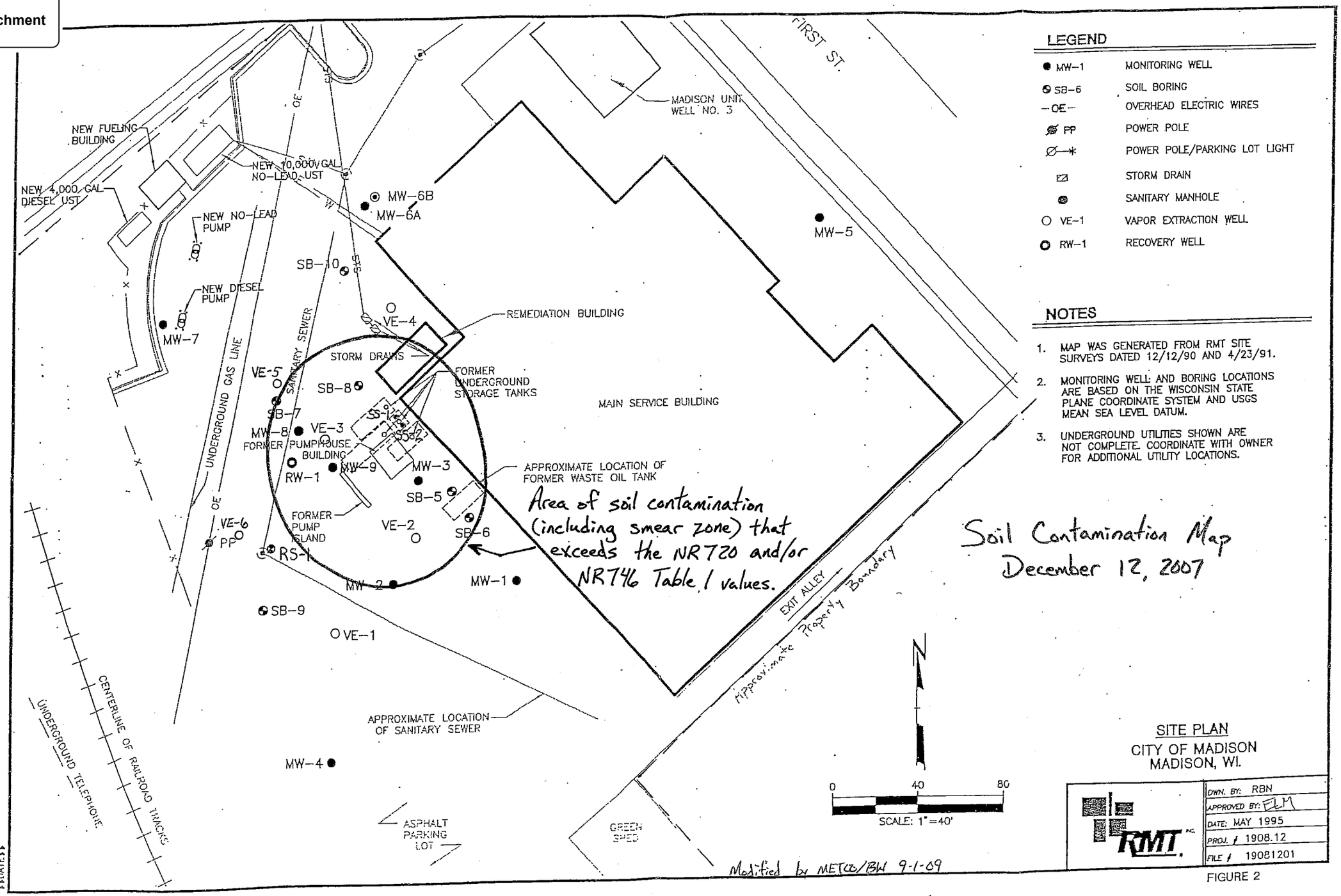
DWN. BY:	RBN
APPROVED BY:	ELM
DATE:	MAY 1995
PROJ. #	1908.12
FILE #	19081201

Modified by METCO/BW 9-1-09

FIGURE 2

$$DWG$$
$$PRF$$
$$SCALE$$
$$DATE$$

Attachment



LEGEND

● MW-1	MONITORING WELL
⊕ SB-6	SOIL BORING
—OE—	OVERHEAD ELECTRIC WIRES
PP	POWER POLE
	POWER POLE/PARKING LOT LIGHT
	STORM DRAIN
	SANITARY MANHOLE
○ VE-1	VAPOR EXTRACTION WELL
◎ RW-1	RECOVERY WELL

NOTES

1. MAP WAS GENERATED FROM RMT SITE SURVEYS DATED 12/12/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND USGS MEAN SEA LEVEL DATUM.
3. UNDERGROUND UTILITIES SHOWN ARE NOT COMPLETE. COORDINATE WITH OWNER FOR ADDITIONAL UTILITY LOCATIONS.

SITE PLAN
CITY OF MADISON
MADISON, WI.

RMT INC.

DWN. BY:	RBN
APPROVED BY:	ELM
DATE:	MAY 1995
PROJ. #	1908.12
FILE #	19081201

FIGURE 2

DWG:
PRF:
$$SCALE$$
$$DATE$$

Attachment

PAVEMENT COVER BARIER MAINTENANCE PLAN

June 25, 2010

First Street Garage

Property Located at:

200 N. First Street, Madison, WI 53704

WDNR BRRTS # 03-13-000438

See attached deed for legal description (Exhibit A).
TAX # 071006315074

Introduction

This document is the Maintenance Plan for a pavement cover (concrete and asphalt) at the above-referenced property in accordance with the requirements of s. NR 724.13(2), Wisconsin Administrative Code. The maintenance activities relate to the existing paved surfaces occupying the area over the contaminated soil and groundwater on the property. The contaminated soil and groundwater is impacted by TPH as Diesel, Benzene, Ethylbenzene, MTBE, Naphthalene, Toluene, Trimethylbenzenes, and Xylene. The location of the paved surfaces to be maintained in accordance with this Maintenance Plan, as well as the impacted soil plume, are identified in the attached map (Exhibit B).

Cover Purpose

The paved surfaces over the contaminated soil and groundwater serves as a barrier to prevent direct human contact with residual soil contamination that might otherwise pose a threat to human health. These paved surfaces also act as a partial infiltration barrier to minimize future soil to groundwater contamination migration that would violate the groundwater standards in ch. NR140, Wisconsin Administrative Code. Based on the current and future use of the property, the barrier should function as intended unless disturbed.

Annual Inspection

The paved surfaces overlying the contaminated soil and groundwater as depicted in Exhibit B will be inspected once a year, normally in the spring after all snow and ice is gone, for erosion and other potential problems that can cause exposure to the underlying contaminated soils or additional infiltration into groundwater. The inspections will be performed to evaluate erosion due to settling, run-off, and other factors. Any area where the underlying contaminated soils have become or are likely to become exposed will be documented. A log of the inspections and any repairs will be maintained by the property owner and is included as Exhibit C, Cap Inspection Log. The log will include

Attachment

recommendations for necessary repair of any areas where underlying soils are exposed. Once repairs are completed, they will be documented in the inspection log.

Maintenance Activities

If problems are noted during the annual inspections or at any other time during the year, repairs will be scheduled as soon as practical. Repairs can include patching and filling operations or they can include larger resurfacing or construction operations. In the event that necessary maintenance activities expose the underlying soil, the owner must inform maintenance workers of the direct contact exposure hazard and provide them with appropriate personal protection equipment ("PPE"). The owner must also sample any soil that is excavated from the site or property prior to disposal to ascertain if contaminants remain. The soil must be treated, stored and disposed of by the owner in accordance with applicable local, state and federal law.

In the event the paved surfaces overlying the contaminated soil is removed or replaced, the replacement barrier must be, at a minimum, equal in thickness as the original cover. Any replacement barrier will be subject to the same maintenance and inspection guidelines as outlined in this Maintenance Plan unless indicated otherwise by the WDNR or its successor.

The property owner, in order to maintain the integrity of the paved surfaces , will maintain a copy of this Maintenance Plan on-site and make it available to all interested parties (i.e. on-site employees, contractors, future property owners, etc.) for viewing.

Amendment or Withdrawal of Maintenance Plan

This Maintenance Plan can be amended or withdrawn by the property owner and its successors with the written approval of WDNR.

Contact Information
June 2010

Site or Property Owner and Operator:

Brynn Bemis
City of Madison
1600 Emil Street
Madison, WI 53713

Consultant:

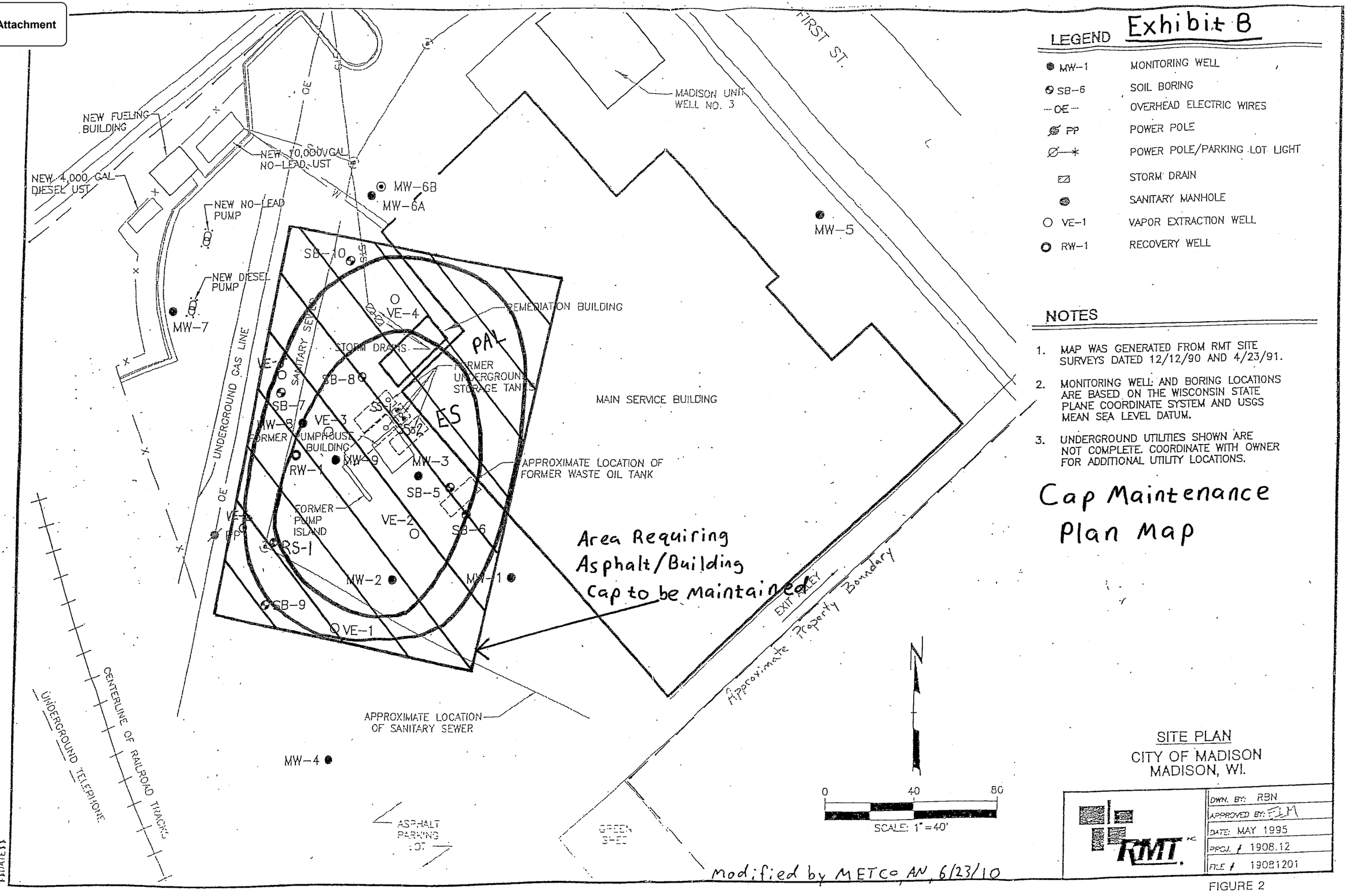
Jason T. Powell
METCO
1421 State Road 16
La Crosse WI, 54601
(608) 781-8879

WDNR:

Larry Lester
WDNR South Central Region
3911 Fish Hatchery Rd
Fitchburg, WI 53711-5367
(608) 275-3465

Attachment

Exhibit B



LEGEND

MW-1	MONITORING WELL
SB-6	SOIL BORING
OE	OVERHEAD ELECTRIC WIRES
PP	POWER POLE
	POWER POLE/PARKING LOT LIGHT
	STORM DRAIN
	SANITARY MANHOLE
VE-1	VAPOR EXTRACTION WELL
RW-1	RECOVERY WELL

NOTES

1. MAP WAS GENERATED FROM RMT SITE SURVEYS DATED 12/12/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND USGS MEAN SEA LEVEL DATUM.
3. UNDERGROUND UTILITIES SHOWN ARE NOT COMPLETE. COORDINATE WITH OWNER FOR ADDITIONAL UTILITY LOCATIONS.

Cap Maintenance Plan Map

modified by METCO, AN, 6/23/10

SITE PLAN
CITY OF MADISON
MADISON, WI.

RMT, Inc.

DWN. BY:	RBN
APPROVED BY:	FLM
DATE:	MAY 1995
PROJ. #	1908.12
FILE #	19081201

FIGURE 2

8595

Attachment

Exhibit C

PAVED SURFACE AND BUILDING FOUNDATION INSPECTION LOG – (200 N. First St., Madison, WI)

Inspection Date	Inspector	Condition of Cap	Recommendations	Have Recommendations from previous inspection been implemented?

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
South Central Region Headquarters
3911 Fish Hatchery Road
Fitchburg WI 53711-5397

Scott Walker, Governor
Cathy Stepp, Secretary
Lloyd L. Eagan, Regional Director
Telephone 608-275-3266
FAX 608-275-3338
TTY Access via relay - 711

WISCONSIN
DEPT. OF NATURAL RESOURCES

July 18, 2011

File Ref.: 03-13-000438

Brynn Bemis
City of Madison
1600 Emil Street
Madison WI 53713

Subject: Conditional Closure Decision,
With Requirements to Achieve Final Closure
First Street Garage, 200 North First Street, Madison, Wisconsin
WDNR BRRTS Activity # 03-13-000438

Dear Ms. Bemis:

On June 7, 2011, the South Central Regional Closure Committee reviewed your request for closure of the case described above. The Closure Committee reviews environmental remediation cases for compliance with state rules and statutes to maintain consistency in the closure of these cases. After careful review of the closure request, the Closure Committee has determined that the petroleum contamination on the site from the former underground storage tanks and associated piping and dispensers appears to have been investigated and remediated to the extent practicable under site conditions. Your case has been remediated to Department standards in accordance with s. NR 726.05, Wis. Adm. Code and will be closed if the following conditions are satisfied:

MONITORING WELL ABANDONMENT
The monitoring wells and soil vapor extraction system wells and other remediation system wells at the site must be properly abandoned in accordance with ch. NR 141, Wis. Adm. Code. Documentation of well abandonment must be submitted to the Department on Form 3300-005, found at http://dnr.wi.gov/org/water/dwg/gw/ or provided by the Department of Natural Resources.

When the above condition has been satisfied, please submit the appropriate documentation (well abandonment forms) to verify that applicable conditions have been met, and your case will be closed. Your site will be listed on the DNR's Remediation and Redevelopment GIS Registry. Information that was submitted with your closure request application will be included on the GIS Registry. To review the site on the GIS Registry web page, visit the RR Sites Map page at: http://dnr.wi.gov/org/aw/rr/gis/index.htm.

CONTINUING OBLIGATIONS AND RESPONSIBILITIES
As part of the approval of the closure of this case, you will be responsible for maintaining an impervious cover at the site. In the final closure approval, you will also be required to conduct annual inspections. Documentation of the inspection will be required to be kept on site.

Please be aware that the case may be reopened pursuant to s. NR 726.09, Wis. Adm. Code, if additional information regarding site conditions indicates that contamination on or from the site poses a threat to public health, safety, or welfare or to the environment.

We appreciate your efforts to restore the environment at this site. If you have any questions regarding this letter, please contact me at 608-275-3465.

Sincerely,

Lawrence Lester
Hydrogeologist
Remediation & Redevelopment Program

cc: Powell, Metco

DOCUMENT NO.

1159980

QUIT CLAIM DEED
STATE OF WISCONSIN—FORM 11

Office of Register of Deeds
Dane County, Wisconsin } ss.

Received for Record May 5
A. D. 1966 at 4:00 o'clock P M.
and recorded in vol 817
of Deeds on page 457
Harold K. Vogt Register.

THIS SPACE RESERVED FOR RECORDING DATA

RETURN TO
Robert T. Semrad, Assistant
City Attorney, Madison, Wis.

THIS INDENTURE, Made this 4th day of May
A. D., 19 66 between the CITY OF MADISON, a municipal corporation of Dane County, Wisconsin,

part y of the first part and
the CITY OF MADISON, a municipal corporation of Dane County, Wisconsin
part y of the second part,

Witnesseth, That the said part y of the first part, for and in consideration of the sum of One ($1.00)

Dollars, to it in hand paid by the said part y of the second part, the receipt whereof is hereby confessed and acknowledged, has given, granted, bargained, sold, remised, released and quit-claimed, and by these presents do give, grant, bargain, sell, remise, release and quit-claim unto the said part y of the second part, and to its successors and assigns forever, the following described real estate, situated in the County of Dane, State of Wisconsin, to-wit:

Part of Lots 1, 2 and 3, Block 310, Madison Square Riley Plat, a recorded plat in Section 6, Town 7 North, Range 10 East, City of Madison, Dane County, Wisconsin more fully described as follows:

Beginning at the most Northerly corner of Block 310, Madison Square Riley Plat, a recorded plat in Section 6, Town 7 North, Range 10 East, City of Madison, Dane County, Wisconsin. Thence Southeasterly 117 feet along the Southwest line of North First Street as platted in said plat to the Southeast line of the Northwest 17 feet of lot 3 of said Block 310. Thence Southwesterly 24 feet at right angles to the said Southwest line of North First Street. Thence Northwesterly 51 feet on a line that is parallel to and 24 feet Southwest of measured at right angles to the Southwest line of North First Street to a point that is 66 feet Southeast of measured at right angles to the Southeast line of East Johnson Street. Thence Southwesterly on a line that is parallel to and 66 feet Southeast of measured at right angles to the Southeast line of East Johnson Street to the East right of way line of the Chicago, Milwaukee, St. Paul and Pacific Railroad. Thence Northerly along the said East right of way line to the Southeast line of East Johnson Street. Thence Northeasterly along the Southeast line of East Johnson Street to the point of beginning. Also part of Lots 5, 6, 7, 8, and 9, Block 310, Madison Square Riley Plat, (Over)

To Have and To Hold the same, together with all and singular the appurtenances and privileges thereunto belonging or in anywise thereunto appertaining, and all the estate, right, title, interest and claim whatsoever of the said part y of the first part, either in law or equity, either in possession or expectancy of, to the only proper use, benefit and behoof of the said part y of the second part, its successors and assigns forever.

In Witness Whereof, part y of the first part has hereunto set its hand and seal this 4th day of May, A. D., 19 66

SIGNED AND SEALED IN PRESENCE OF

Bonnie K. Young
Bonnie K. Young

Carol Brehm
Carol Brehm

CITY OF MADISON

BY: Otto Festge (SEAL)
Otto Festge, Mayor

Eldon L. Hoel (SEAL)
Eldon L. Hoel, City Clerk

(SEAL)

(SEAL)

STATE OF WISCONSIN,
Dane County. } ss.

Personally came before me, this 4th day of May A. D., 19 66 the above named Otto Festge, and Eldon L. Hoel, City Clerk of the above named municipal corporation

to me known to be the person s who executed the foregoing instrument and acknowledged the same.

(SEAL)

Robert T. Semrad
Notary Public, Dane County, Wis.
My Commission is perpetual

THIS INSTRUMENT DRAFTED BY Robert T. Semrad

VOL 817 PAGE 457

(Section 59.51 (1) of the Wisconsin Statutes provides that all instruments to be recorded shall have plainly printed or typewritten thereon the names of the grantors, grantees, witnesses and notary).

QUIT CLAIM DEED—STATE OF WISCONSIN, FORM NO. 11

FURNISHED BY DANE COUNTY TITLE COMPANY

8595

a recorded plat in Section 6, Town 7 North, Range 10 East, City of Madison, Dane County, Wisconsin more fully described as follows:

Beginning at a point on the Southwest line of North First Street, said point being the Southwest line of North First Street as platted in the Madison Square Riley Plat, a recorded plat in Section 6, Town 7 North, Range 10 East, City of Madison, Dane County, Wisconsin, and 7 feet Southeast of the Northwest line of Lot 5 of said Block 310; thence Southeasterly 212 feet along the Southwest line of North First Street to a point that is 175 feet Northwest of the Southwesterly prolongation of the Northwest line of East Mifflin Street, measured along the Southwest line of North First Street, thence Southwesterly 24 feet along a line that is parallel to and 175 feet Northwest of measured at right angles to the Southwesterly prolongation of the Northwest line of East Mifflin Street. Thence Northwesterly 212 feet along a line that is parallel to and 24 feet Southwest of the Southwest line of North First Street to the Southeast line of the Northwest 7 feet of said Lot 5; thence Northeasterly 24 feet along a line that is parallel to and 7 feet Southeast of measured at right angles to the Northwest line of said Lot 5 to the point of beginning.

Return to Robert T. Semrad, Asst. City Atty.
Charge to Wis. Hwy. 113

Office of Register of Deeds
Dane County, Wisconsin
Received for Record May 5
A. D. 1966 at 2 o'clock P M
and recorded in vol. 817 Deeds
of page 457
Register

8595

1,199980 INDEXED

Quit Claim Deed

City of Madison
TO
City of Madison

GTE
TYPED ✓
COMP ✓
INIT

DOCUMENT NO. 1139979 VOL 817 PAGE 456

QUIT CLAIM DEED
STATE OF WISCONSIN—FORM 11

Office of Register of Deeds
Dane County, Wisconsin } ss.

Received for Record May 5
A. D. 1966 at 4:00 o'clock P M
and recorded in vol. 817 of Deeds on page 456
Harold K. Hoel Register.

THIS SPACE RESERVED FOR RECORDING DATA

RETURN TO
Robert T. Semrad, Asst. City Atty., Madison, Wisconsin

THIS INDENTURE, Made this 4th day of May A. D., 19 66, between the CITY OF MADISON, a municipal corporation of Dane County, Wisconsin part y of the first part and the CITY OF MADISON, a municipal corporation of Dane County, Wisconsin part y of the second part.

Witnesseth, That the said part y of the first part, for and in consideration of the sum of $1.00 Dollars, to it in hand paid by the said part y of the second part, the receipt whereof is hereby confessed and acknowledged, has given, granted, bargained, sold, remised, released and quit-claimed, and by these presents do give, grant, bargain, sell, remise, release and quit-claim unto the said part y of the second part, and to its successors heirs and assigns forever, the following described real estate, situated in the County of Dane State of Wisconsin, to-wit:

Part of Lots 3, 4 and 5, Block 310, Madison Square Riley Plat, a recorded plat in Section 6, Town 7 North, Range 10 East, City of Madison, Dane County, Wisconsin more fully described as follows:

Beginning at a point on the Southwest line of North First Street as platted in Madison Square Riley Plat, a recorded plat in Section 6, Town 7 North, Range 10 East, City of Madison, Dane County, Wisconsin. Said point being 17 feet Southwest of the most Northerly corner of Lot 3, Block 310 of said plat, measured along the said Southwest line of North First Street. Thence Southeasterly 90 feet along the said Southwest line of North First Street to a point that is 7 feet Southeast of the Northwest line of Lot 5, of said Block 310; thence Southwesterly 24 feet on a line that is parallel to and 7 feet Southeast of measured at right angles to the Northwest line of said Lot 5; thence Northwesterly 90 feet on a line that is parallel to and 24 feet Southwest of measured at right angles to the Southwest line of North First Street. Thence Northeasterly at right angles 24 feet to the point of beginning.

To Have and To Hold the same, together with all and singular the appurtenances and privileges thereunto belonging or in anywise thereunto appertaining, and all the estate, right, title, interest and claim whatsoever of the said part y of the first part, either in law or equity, either in possession or expectancy of, to the only proper use, benefit and behoof of the said part y of the second part, its successors xxx heirs and assigns forever.

In Witness Whereof, part y of the first part ha s hereunto set its hand and seal this 4th day of May A. D., 19 66 CITY OF MADISON

SIGNED AND SEALED IN PRESENCE OF

Bonnie K. Young

Bonnie K. Young

Carol Brehm

Carol Brehm

BY: Otto Festge (SEAL)
Otto Festge, Mayor

Eldon L. Hoel (SEAL)
Eldon L. Hoel, City Clerk

(SEAL)

(SEAL)

STATE OF WISCONSIN,
Dane County. } ss.

Personally came before me, this 4th day of May A. D., 19 66 the above named Otto Festge, Mayor and Eldon L. Hoel, City Clerk of the above named municipal corporation

to me known to be the person s who executed the foregoing instrument and acknowledged the same, as such officials as the act of said municipal corporation by its authority.

(SEAL)

Robert T. Semrad
Notary Public, Dane County, Wis.
My Commission is perpetual A. D. 19

8595

THIS INSTRUMENT DRAFTED BY Robert T. Semrad

(Section 59.51 (1) of the Wisconsin Statutes provides that all instruments to be recorded shall have plainly printed or typewritten thereon the names of the grantors, grantees, witnesses and notary).

QUIT CLAIM DEED—STATE OF WISCONSIN, FORM NO. 11 FURNISHED BY DANE COUNTY TITLE COMPANY

VOL 687 PAGE 586

DOCUMENT NO. 971256

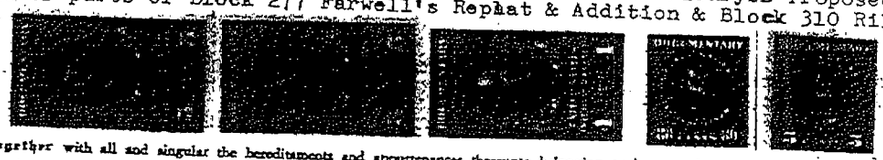
This Indenture, Made this 23rd day of October A. D., 19 58
between John O. Reeb and Leona M. Reeb, his wife

part of the first part and
City of Madison, a Municipal Corporation part y of the second part.

Witnesseth, That the said part ies of the first part, for and in consideration of the sum of
One dollar and other good and valuable consideration
to them in hand paid by the said part y of the second part, the receipt whereof is hereby confessed and acknowledged, ha ve given, granted, bargained, sold, remised, released, aliened, conveyed and confirmed, and by these presents do give, grant, bargain, sell, remise, release, alien, convey and confirm unto the said part y of the second part, its heirs and assigns forever the following described real estate situated in the County of Dane and State of Wisconsin, to-wit:

Part of Block 277 Farwell's Replat & Addition to the City of Madison and more particularly described as follows: Beginning at the point of intersection of the Northerly line of East Washington Avenue and the Westerly line of First Street; thence Northwesterly along the Westerly line of First Street 262 feet to the point of beginnin of this description; thence Southwesterly 100 feet to a point which is 258 feet Northwesterly from the Northwesterly line of East Washington Avenue; thence Northwesterly parallel to First Street 34.8 feet; thence Northeasterly 100 feet to a point which is on the Westerly line of First Street and 296 feet Northwesterly from the Northwesterly line of East Washington Avenue; thence Southeasterly along above mentioned line 34 feet to the point of beginning.

The above parcel is also described as Lot 6 of Fleury's Proposed Replat of parts of Block 277 Farwell's Replat & Addition & Block 310 Riley Plat.



Together with all and singular the hereditaments and appurtenances thereunto belonging or in any wise appertaining; and all estate right, title, interest, claim or demand whatsoever, of the said part ies of the first part, either in law or equity, either in possession or expectancy of, in and to the above bargained premises, and their hereditaments and appurtenances.

To have and to hold the said premises as above described with the hereditaments and appurtenances, unto the said part y of the second part, and to its successors heirs and assigns FOREVER.

And the said John O. Reeb and Leona M. Reeb, his wife

for themselves their heirs, executors and administrators, do covenant, grant, bargain, and agree to and with the said part y of the second part its successors heirs and assigns, that at the time of the ensealing and delivery of these presents they are well seized of the premises above described, as of a good, sure, perfect, absolute and indefeasible estate of inheritance in the law, in fee simple, and that the same are free and clear from all incumbrances whatever.

and that the above bargained premises in the quiet and peaceable possession of the said part ies of the second part, their heirs and assigns, against all and every person or persons lawfully claiming the whole or any part thereof will forever WARRANT AND DEFEND.

In Witness Whereof, the said part ies of the first part he ve hereunto set their hand s and seal s this 23rd day of October, A. D., 1958

SIGNED AND SEALED IN PRESENCE OF

Sverre O. Braathen

Henry B. Buslee

John O. Reeb (SEAL)

Leona M. Reeb (SEAL)

(SEAL)

(SEAL)

Drafted by Sverre O. Braathen
Madison, Wisconsin

STATE OF WISCONSIN, Dane County, ss.

8595 Personally came before me this 23rd day of October, A. D., 19 58
the above named John O. Reeb and Leona M. Reeb, his wife
to me known to be the persons who executed the foregoing instrument and acknowledged the same.

Received for Record this 15th day of December A. D., 1958 at 11:00 o'clock A. M.

Harold K. Hill
Register of Deeds

By: Bertha L. Bunn
Deputy Register of Deeds

Sverre O. Braathen (SEAL)
Notary Public Dane County, Wis.

My Commission expires February 14 A. D., 19 60

STATE OF WISCONSIN

[redacted]

VOL 817 PAGE 262

DOCUMENT 1159479

This indenture, Made this 7th day of April, A. D., 19 66 between Madison Metropolitan Sewerage District, a Corporation duly organized and existing under and by virtue of the laws of the State of Wisconsin, located at Madison, Wisconsin, party of the first part, and the City of Madison, a municipal corporation of Dane County, Wisconsin

party of the second part.

Witnesseth, That the said party of the first part, for and in consideration of the sum of $1.00 and other good and valuable consideration Dollars, to it paid by the said party of the second part, the receipt whereof is hereby confessed and acknowledged, has given, granted, bargained, sold, remised, released and quit-claimed, and by these presents does give, grant, bargain, sell, remise, release and quit-claim unto the said party of the second part, and to its heirs, and assigns forever the following described real estate, situated in the County of Dane, State of Wisconsin, to-wit:

Part of Lots 9, 10, 11 and 12 of Block 310, Madison Square Riley Plat, a recorded plat in Section 6, Town 7 North, Range 10 East, City of Madison, Dane County, Wisconsin, more fully described as follows:

Beginning at the point of intersection of the Southwesterly prolongation of the Northwest line of East Mifflin Street as platted in Madison Square Riley Plat, a recorded plat in Section 6, Town 7 North, Range 10 East, City of Madison, Dane County, Wisconsin, with the Southwest line of North First Street as platted in said plat. Thence Southwesterly 24 feet on the Southwesterly prolongation of the Northwest line of East Mifflin Street; thence Northwesterly 175 feet on a line that is parallel to and 24 feet Southwest of measured at right angles to the Southwest line of North First Street. Thence Northeasterly 24 feet on a line that is parallel to and 175 feet Northwest of measured at right angles to the Southwesterly prolongation of the Northwest line of East Mifflin Street to the Southwest line of North First Street; thence Southeasterly 175 feet along the Southwest line of North First Street to the point of beginning.

DANE 5 9 4 7 9 APR 29 66

150 ft.

To have and to hold the same, together with all and singular the appurtenances and privileges thereunto belonging or in any wise thereunto appertaining, and all the estate, right, title, interest and claim whatsoever of the said party of the first part, either in law or equity, either in possession or expectancy of, to the only proper use, benefit and behoof of the said party of the second part, its heirs and assigns FOREVER.

In Witness Whereof, the said Madison Metropolitan Sewerage District, party of the first part, has caused these presents to be signed by James G. Woodburn, its President, and countersigned by William J. Polk, its Secretary, at Madison, Wisconsin, and its corporate seal to be hereunto affixed, this 7th day of April, A. D., 19 66.

SIGNED AND SEALED IN PRESENCE OF

H. C. Lord

W. J. Landwehr

MADISON METROPOLITAN SEWERAGE DISTRICT
Corporate Name

James G. Woodburn
President

COUNTERSIGNED:

William J. Polk
Secretary

STATE OF WISCONSIN }
Dane County. } ss.

Personally came before me, this 7th day of April, A. D., 19 66, James G. Woodburn, President, and William J. Polk, Secretary of the above named Corporation, to me known to be the persons who executed the foregoing instrument, and to me known to be such President and Secretary of said Corporation, and acknowledged that they executed the foregoing instrument as such officers as the deed of said Corporation, by its authority.

Received for Record this 29th day of April, A. D., 19 66 at 3:25 o'clock P M.

8595

Harold K. Rill
Register of Deeds

By: Bertha L. Dumas
Deputy Register of Deeds

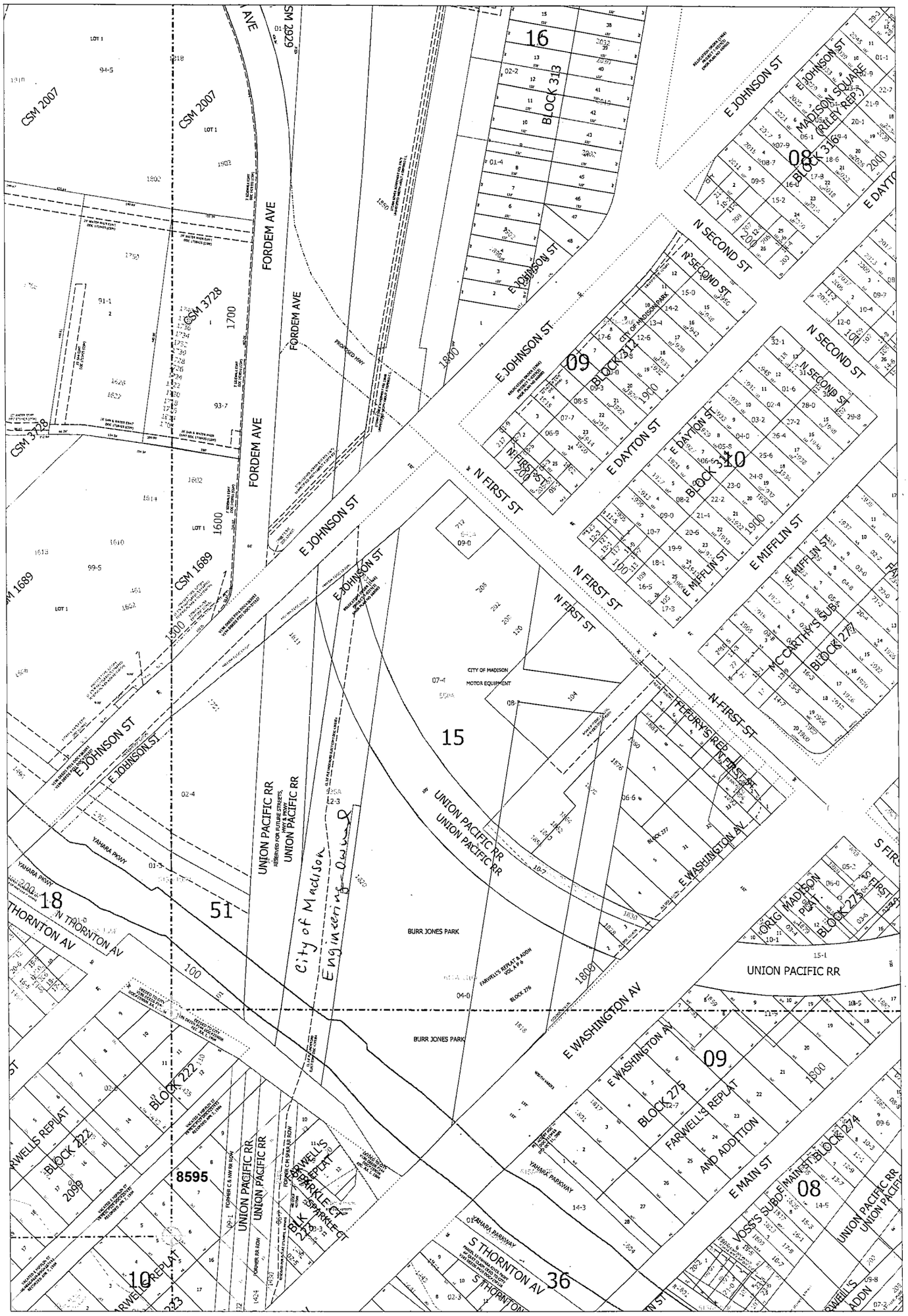
(SEAL)

Pauline Gardner
Notary Public, Dane County, Wis.

My commission expires Oct. 16, A. D., 19 66.

This instrument was drafted by Robert T. Semrad, Assistant City Attorney

QUIT CLAIM DEED—By Corporation STATE OF WISCONSIN FORM No. 22 Wisconsin Legal Blank Company Milwaukee, Wisconsin 54454

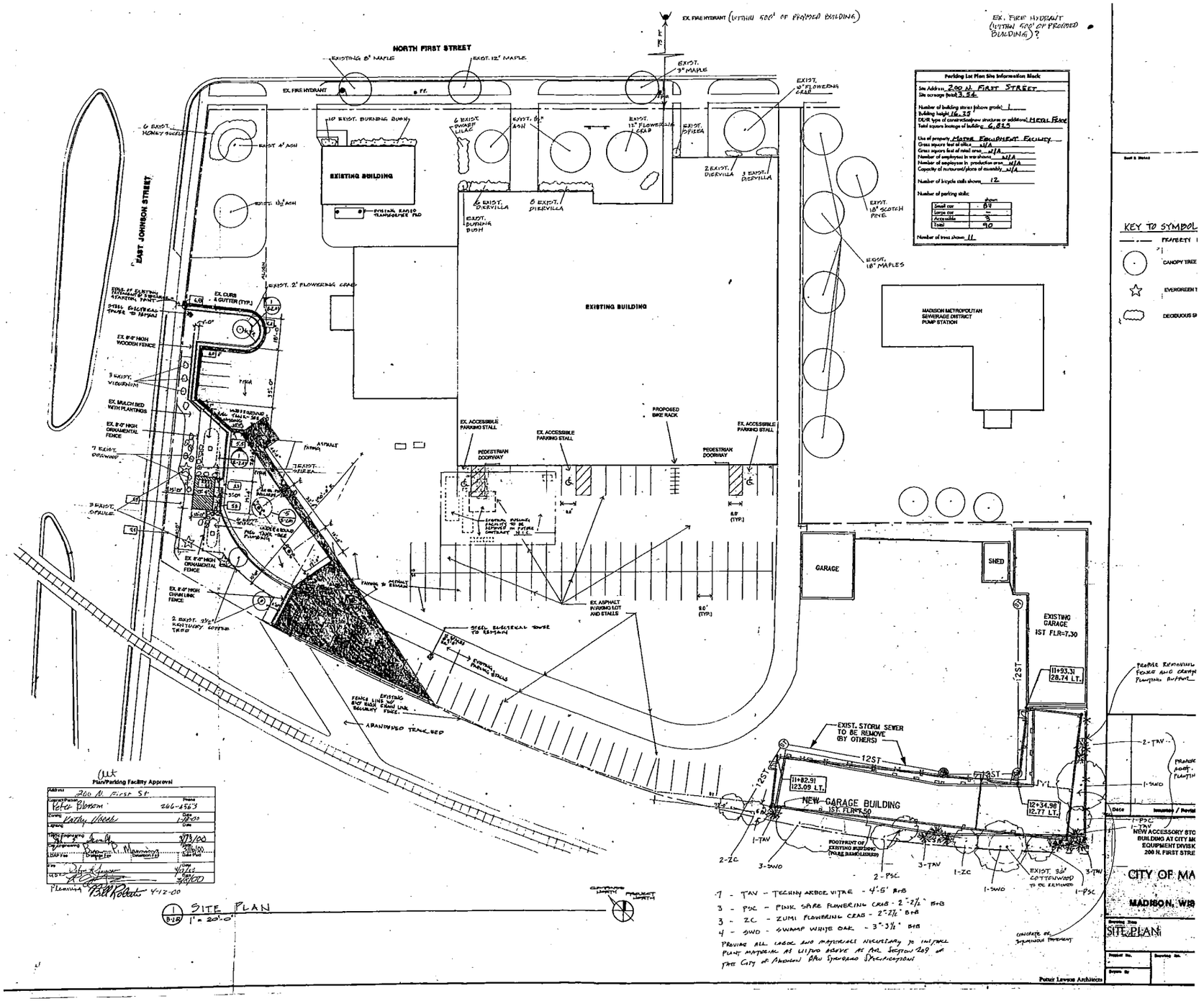


Time: 08/17/09 10:41:08
Session: D:\GTViewer\Eric_1.gts

City of Madison, WI. - GIS/Mapping data

Printed By: enetp

Disclaimer: The City makes no representation about the accuracy of these records and shall not be liable for any damages


NORTH FIRST STREET
EAST JOHNSON STREET
EX. FIRE HYDRANT (WITHIN 500' OF PROPOSED BUILDING)
EX. FIRE HYDRANT (WITHIN 500' OF PROPOSED BUILDING)?
EXISTING BUILDING
EXISTING BUILDING
MADISON METROPOLITAN SEWERAGE DISTRICT PUMP STATION
GARAGE
SHED
EXISTING GARAGE 1ST FLR=7.30
NEW GARAGE BUILDING 1ST FLR=7.50
EX. ACCESSIBLE PARKING STALL
EX. ACCESSIBLE PARKING STALL
EX. ACCESSIBLE PARKING STALL
PROPOSED BIKE RACK
PEDESTRIAN DOORWAY
PEDESTRIAN DOORWAY
EX. ASPHALT PARKING LOT AND STALLS
EXISTING PARKING STALLS
EX. CURB & GUTTER (TYP.)
EX. 6'-0" HIGH WOODEN FENCE
EX. MULCH BED WITH PLANTINGS
EX. 6'-0" HIGH ORNAMENTAL FENCE
EX. 6'-0" HIGH CHAIN LINK FENCE
EXIST. 2" FLOWERING CRAB
EXIST. 18" SCOTCH PINE
EXIST. 18" MAPLES
EXIST. 12" FLOWERING CRAB
EXIST. 9" MAPLE
EXIST. 8" MAPLE
EXIST. 12" MAPLE
EXIST. 4" ASH
EXIST. 10" ASH
EXIST. 8" ASH
EXIST. BURNING BUSH
EXIST. DWARF LILAC
EXIST. SPIREA
EXIST. DIERVILLA
EXIST. HONEYSUCKLE
EXIST. 2" HACKBERRY TREES
EXIST. VIBURNUM
EXIST. DOGWOOD
EXIST. YUCCA
EXIST. JUNIPER
EXIST. 2½" HACKBERRY TREES
STEEL ELECTRICAL TOWER TO REMAIN
ABANDONED TRACKBED
EXISTING 6'-0" CHAIN LINK SECURITY FENCE TO REMAIN
EXISTING 6'-0" CHAIN LINK SECURITY FENCE LINE W/ CHAIN LINK FENCE
EXIST. STORM SEWER TO BE REMOVE (BY OTHERS)
EXIST. 36" COTTONWOOD TO BE REMOVED
FOOTPRINT OF EXISTING BUILDING (TO BE DEMOLISHED)
CONCRETE OR BITUMINOUS PAVEMENT
PROPOSED RETAINING FENCE AND CREEPING PLANTING BUFFER
11+93.31 28.74 LT.
11+82.91 123.09 LT.
12+34.98 12.77 LT.
12ST
1YL
Parking Lot Plan Site Information Block
Site Address 200 N. FIRST STREET
Site acreage (total) 3.54
Number of building stories (above grade) 1
Building height 16.33
Describe type of canopies/outdoor structure or additional METAL FENCE
Total square footage of building(s) 6,833
Use of property MOTOR EQUIPMENT FACILITY
Gross square feet of office N/A
Gross square feet of retail area 2/A
Number of employees in one shown N/A
Number of employees in production area N/A
Capacity of restaurant/place of assembly N/A
Number of bicycle stalls shown 12
Number of parking stalls
Small car 69
Large car —
Accessible 3
Total 90
Number of trees shown 11
KEY TO SYMBOL
PROPERTY
CANOPY TREE
EVERGREEN T
DECIDUOUS SH
Plan/Parking Facility Approval
Address 200 N. First St
Engineer/Planner Peter Blossom 266-4563
Zoning Kathy Voeck 1-18-00
Engineering Date
Traffic Engineering 3/13/00
Water Utility 3/16/00
Fire Dept. 3/16/00
City Engineer 4/7/00
Planning 3/30/00
Planning Bill Roberts 4-12-00
7 - TAV - TECHNY ARBOR VITAE - 4'-5' B&B
3 - PSC - PINK SARG FLOWERING CRAB - 2"-2½" B&B
3 - ZC - ZUMI FLOWERING CRAB - 2"-2½" B&B
4 - SWO - SWAMP WHITE OAK - 3"-3½" B&B
PROVIDE ALL LABOR AND MATERIALS NECESSARY TO INSTALL PLANT MATERIAL AS LISTED ABOVE AS PER SECTION 209 OF THE CITY OF MADISON ORM STANDARD SPECIFICATIONS
1 SITE PLAN
B-1B
1" = 20'-0"
NEW ACCESSORY STO
BUILDING AT CITY MA
EQUIPMENT DIVISI
200 N. FIRST STRE
CITY OF MA
MADISON, WI
SITE PLAN
Potter Lawson Architects

WDNR BRRTS Case #: 03-13-000438

WDNR Site Name: First Street Garage

Geographic Information System (GIS) Registry of Closed Remediation Sites

In compliance with the revisions to the NR 700 rule series requiring certain closed sites to be listed on the Geographic Information System (GIS) Registry of Closed Remediation Sites (Registry) effective Nov., 2001, I have provided the following information.

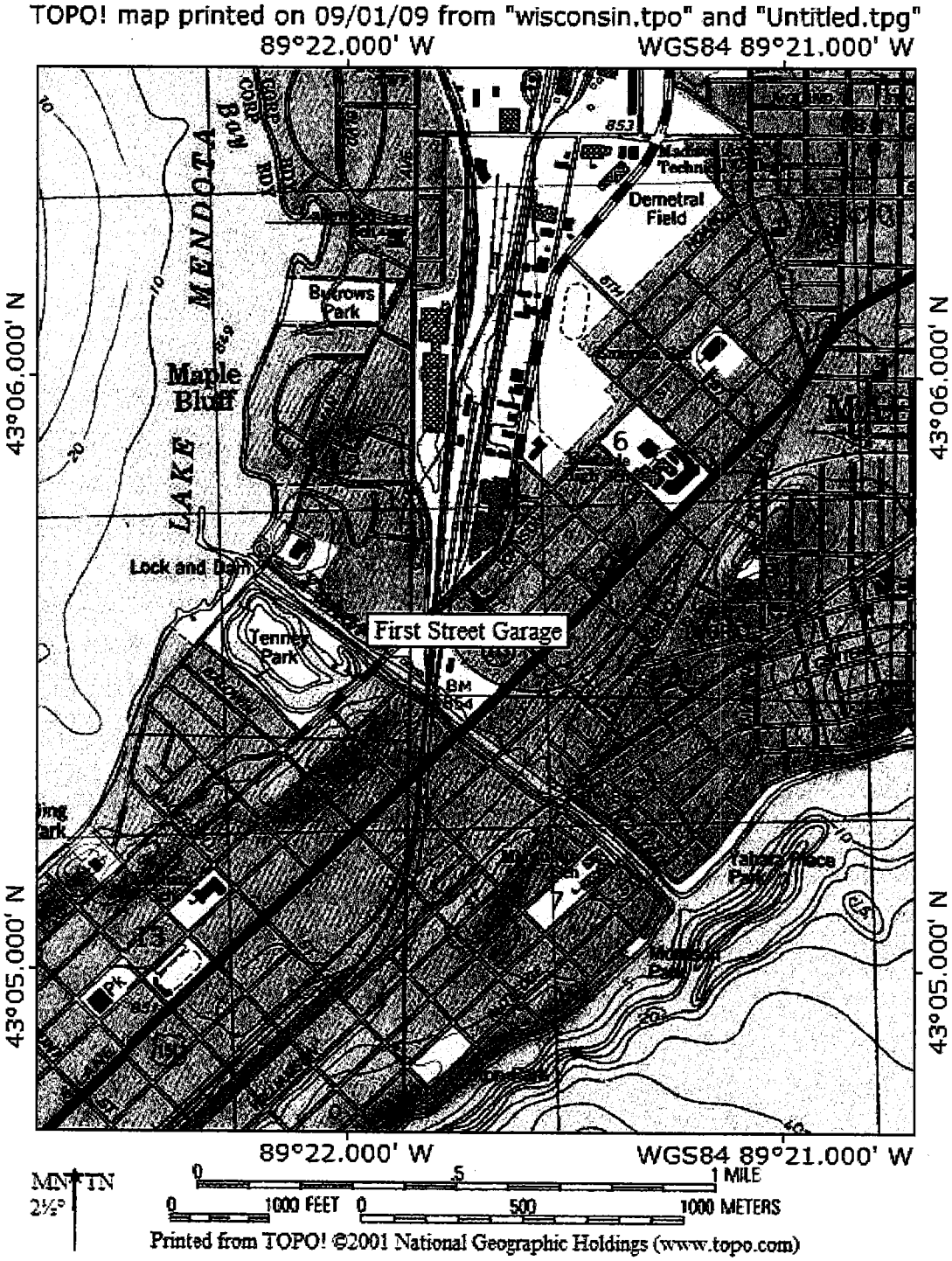
To the best of my knowledge the legal descriptions provided and attached to this statement are complete and accurate.

Responsible Party:

Brynn Bemis, Hydrogeologist
(print name/title)

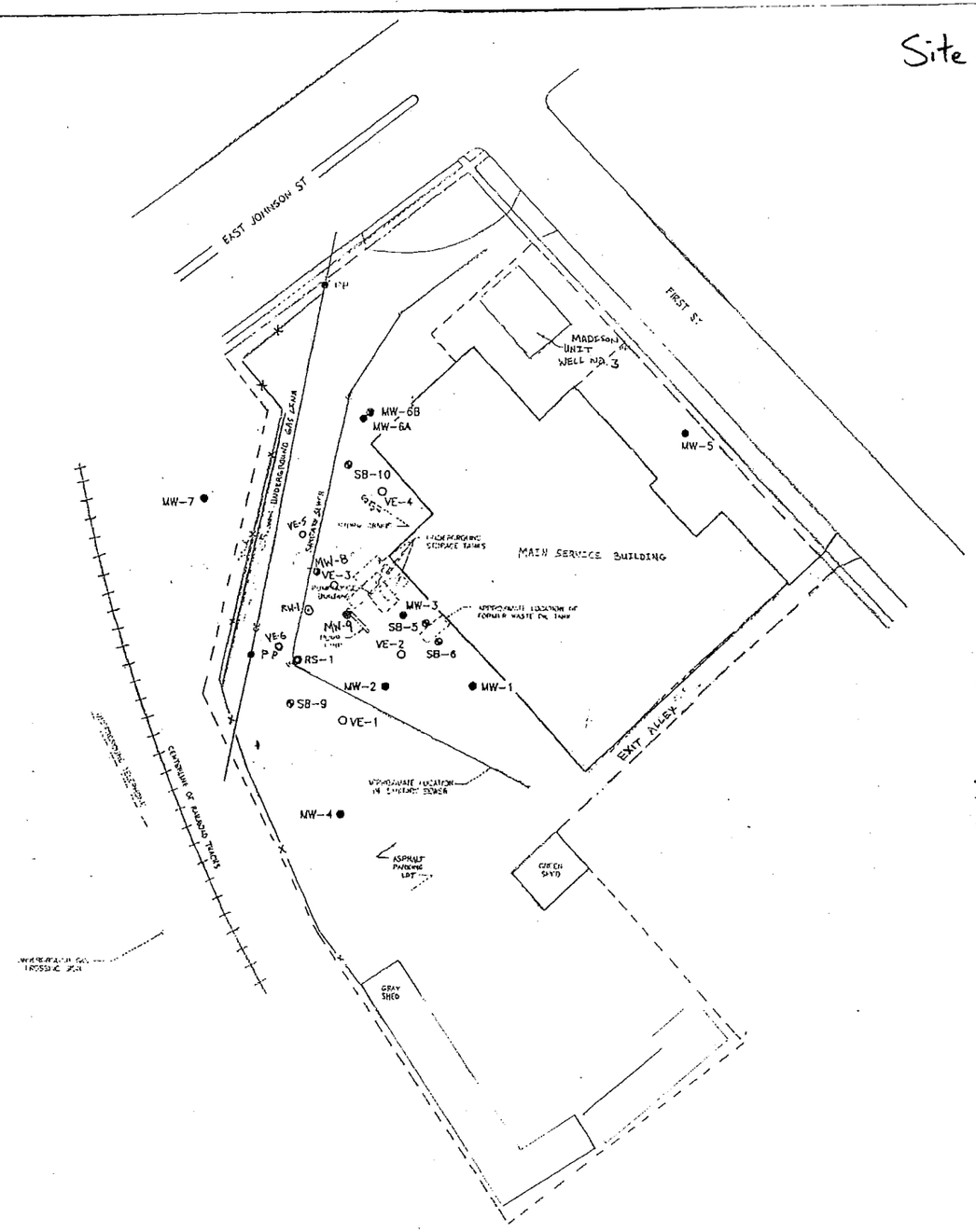
Brynn Bemis
(signature)

8/25/09
(date)



SITE LOCATION MAP – CONTOUR INTERVAL 10 FEET
FIRST STREET GARAGE – MADISON, WI
SEAMLESS USGS TOPOGRAPHIC MAPS ON CD-ROM

Site Layout Map



NOTE: STAFF GAGE #1 IS LOCATED APPROXIMATELY 1,100' SOUTH-SOUTHWEST OF THE INTERSECTION OF JOHNSON AND FIRST STREETS ON THE RAILROAD BRIDGE OVER THE YAHARA RIVER.

LEGEND

- MW-1 EXISTING MONITORING WELL
- SB-1 EXISTING BORING
- OHL OVERHEAD ELECTRIC WIRES
- PP POWER POLE
- PP/LT POWER POLE/PARKING LOT LIGHT
- SD STORM DRAIN
- SS SANITARY MANHOLE
- VE-1 PROPOSED VAPOR EXTRACTION WELL
- RS-1 PROPOSED RECOVERY SUMP
- —X— FENCE
- — — — PROPERTY BOUNDARY

NOTES

1. MAP WAS GENERATED FROM PAST SITE SURVEYS DATED 12/12/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND USGS MEAN SEA LEVEL DATUM.

N

0 40 80

SCALE: 1" = 40'

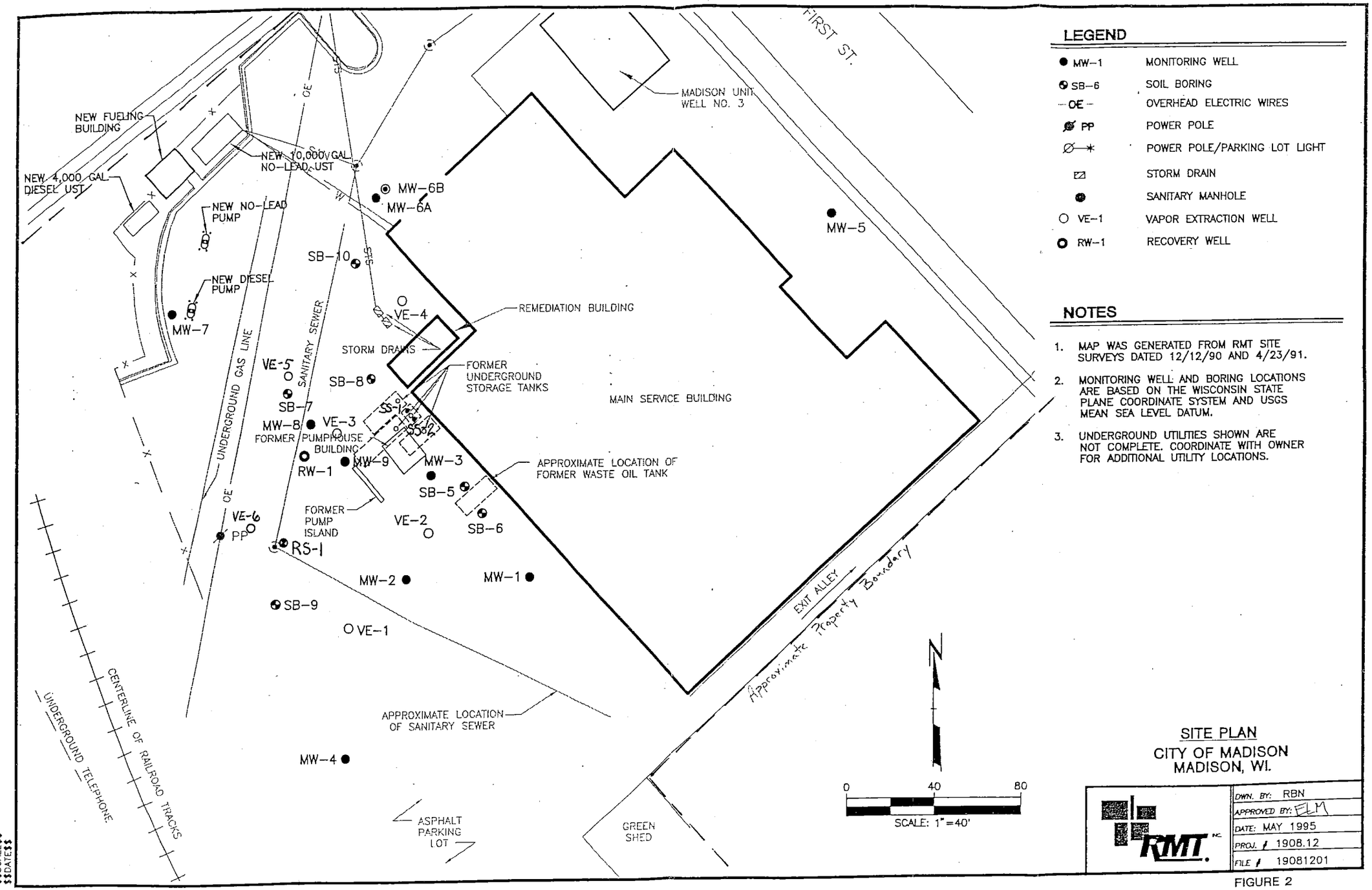
NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: FIRST STREET GARAGE
CITY OF MADISON
MADISON, WI

DRAWN BY	BLG	SCALE: 1" = 40'	PROJ. NO. 180E-08
CHECKED BY	DTS		DRWG. NO. 180E-88-1
APPROVED BY	DTS/AK	DATE PLOTTED: JUL 16 1992	FILE NO. 180E0808
DATE:	JUNE 1992		SHEET FIGURE 1

RMT INC.
744 Heartland Trail
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444

Modified by METCO/BW 6-20-07



LEGEND

● MW-1	MONITORING WELL
⊙ SB-6	SOIL BORING
-OE-	OVERHEAD ELECTRIC WIRES
PP	POWER POLE
	POWER POLE/PARKING LOT LIGHT
	STORM DRAIN
	SANITARY MANHOLE
○ VE-1	VAPOR EXTRACTION WELL
◎ RW-1	RECOVERY WELL

NOTES

1. MAP WAS GENERATED FROM RMT SITE SURVEYS DATED 12/12/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND USGS MEAN SEA LEVEL DATUM.
3. UNDERGROUND UTILITIES SHOWN ARE NOT COMPLETE. COORDINATE WITH OWNER FOR ADDITIONAL UTILITY LOCATIONS.

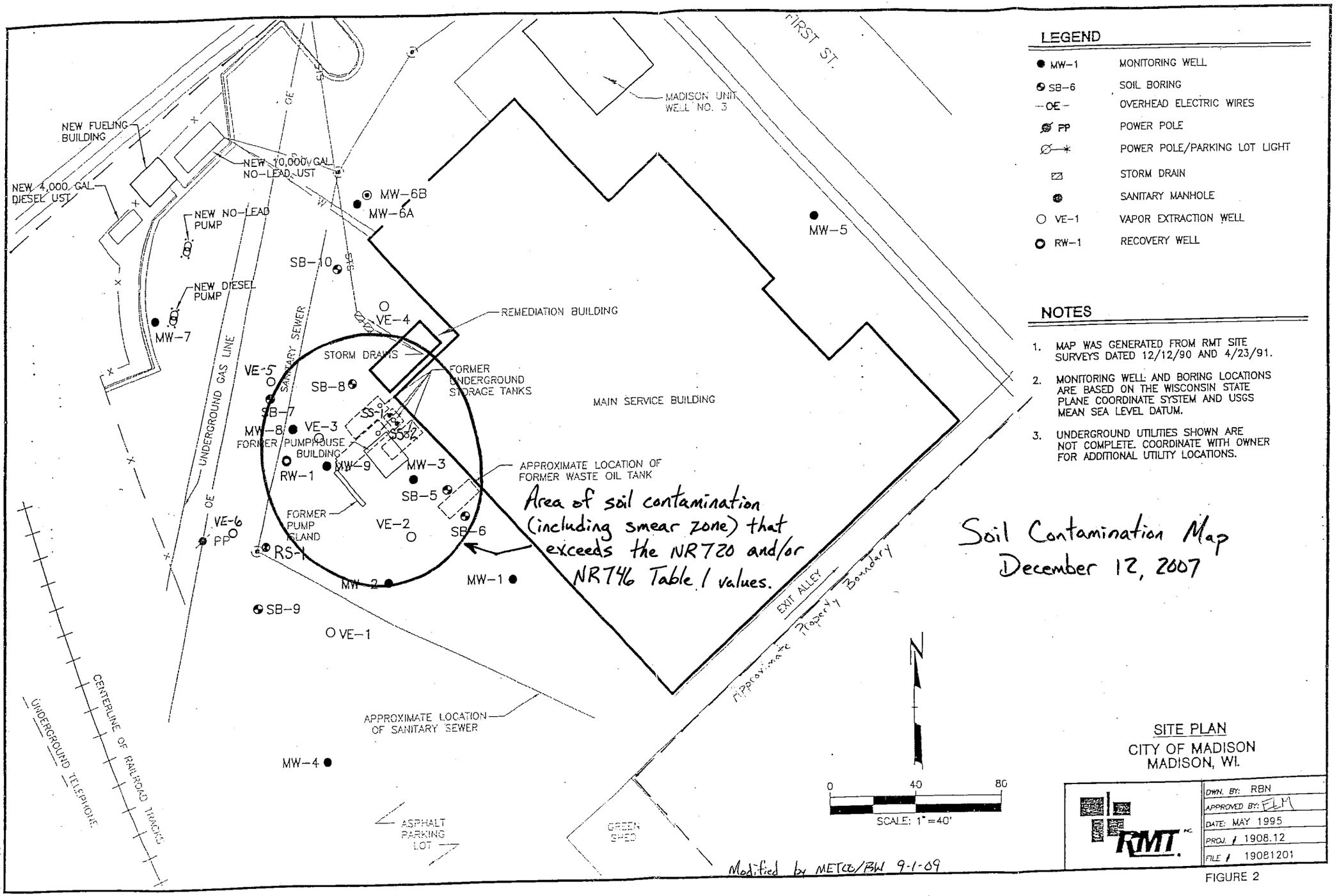
SITE PLAN
CITY OF MADISON
MADISON, WI.

RMT, INC.

DWN. BY:	RBN
APPROVED BY:	ELM
DATE:	MAY 1995
PROJ. #	1908.12
FILE #	19081201

FIGURE 2

DWG:
PRF:
SCALE:
DATE:



LEGEND

● MW-1	MONITORING WELL
⊙ SB-6	SOIL BORING
—OE—	OVERHEAD ELECTRIC WIRES
FP	POWER POLE
	POWER POLE/PARKING LOT LIGHT
	STORM DRAIN
	SANITARY MANHOLE
○ VE-1	VAPOR EXTRACTION WELL
○ RW-1	RECOVERY WELL

NOTES

1. MAP WAS GENERATED FROM RMT SITE SURVEYS DATED 12/12/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND USGS MEAN SEA LEVEL DATUM.
3. UNDERGROUND UTILITIES SHOWN ARE NOT COMPLETE. COORDINATE WITH OWNER FOR ADDITIONAL UTILITY LOCATIONS.

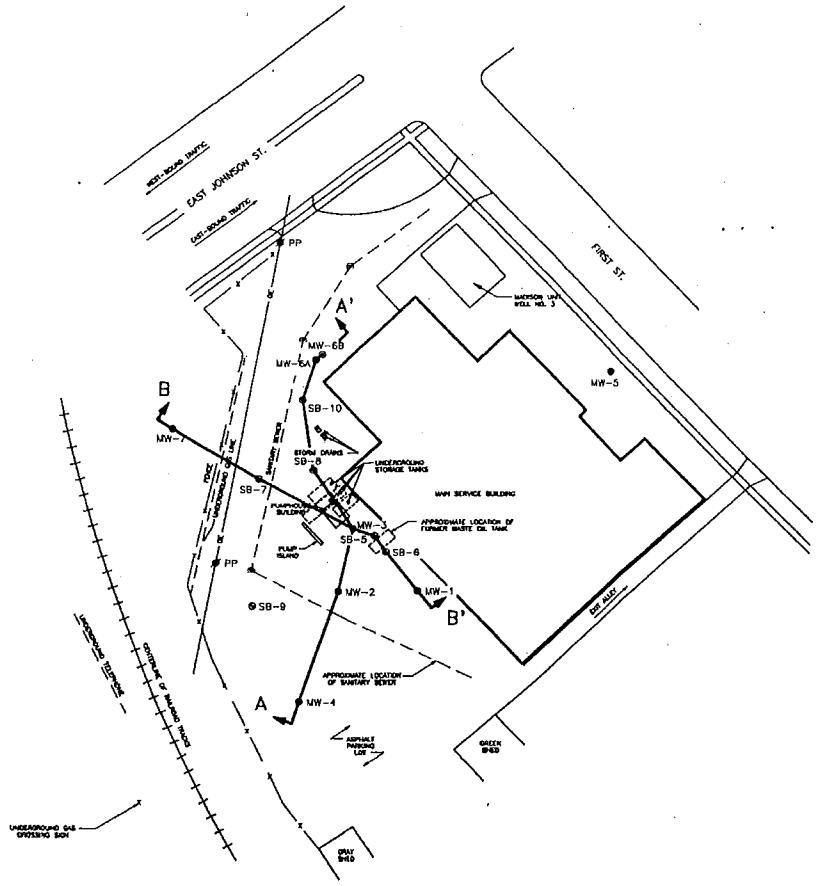
SITE PLAN
CITY OF MADISON
MADISON, WI.

RMT, INC.

DWN. BY:	RBN
APPROVED BY:	ELM
DATE:	MAY 1995
PROJ. #	1908.12
FILE #	19081201

FIGURE 2

$$DWG
$$REF
$$SCALE
$$DATE



NOTE: STAFF GAGE #1 IS LOCATED APPROXIMATELY 1,100' SOUTH-SOUTHWEST OF THE INTERSECTION OF JOHNSON AND FIRST STREETS ON THE RAILROAD BRIDGE OVER THE YAHARA RIVER.

LEGEND

- MW-1 — EXISTING MONITORING WELL
- SB-6 — EXISTING BORING
- -OE- — OVERHEAD ELECTRIC WIRES
- PP — POWER POLE
- PP — POWER POLE/PARKING LOT LIGHT
- STORM DRAIN
- SANITARY MANHOLE
- A — A' — CROSS SECTION LOCATOR

NOTES

1. MAP WAS DIGITIZED FROM RMT SITE SURVEYS DATED 12/11/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND MEAN SEA LEVEL DATUM.

N

0 30 60

SCALE: 1" = 60'

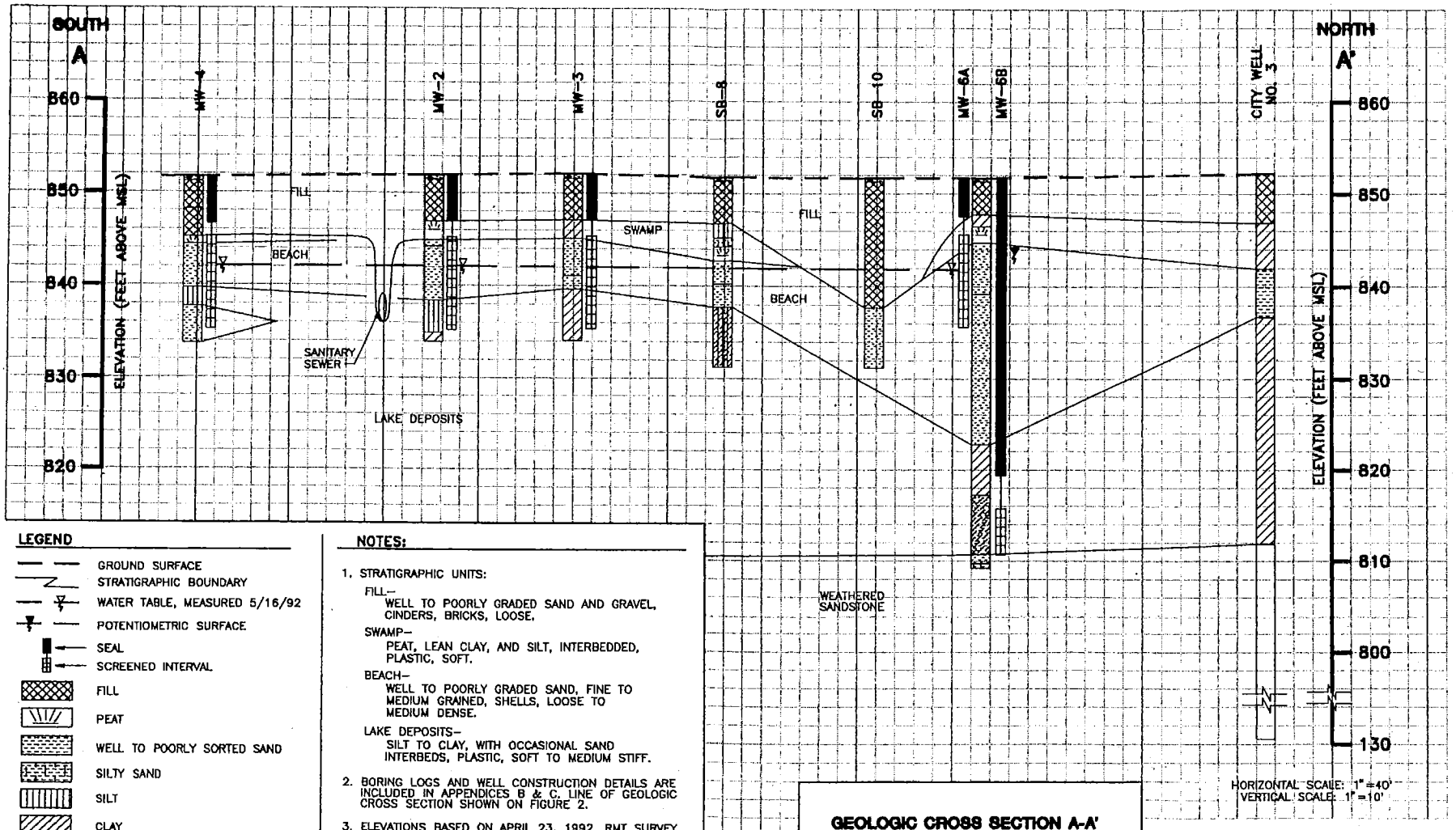
NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: FIRST STREET GARAGE
CITY OF MADISON
MADISON, WI

SHEET TITLE: SITE PLAN

DRAWN BY: BKD/BLD	SCALE: 1" = 60'	PROJ. NO. 1908.06
CHECKED BY: C.L.H.		DWG. NO. 1908.06-1
APPROVED BY: C.L.H.	DATE: OCT '6 1992	FILE NO. 1908001
DATE: JUNE 1992		SHEET FIGURE 2

RMT, INC.
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444



LEGEND

- GROUND SURFACE
- STRATIGRAPHIC BOUNDARY
- WATER TABLE, MEASURED 5/16/92
- POTENTIOMETRIC SURFACE
- SEAL
- SCREENED INTERVAL
- FILL
- PEAT
- WELL TO POORLY SORTED SAND
- SILTY SAND
- SILT
- CLAY
- CLAYEY SAND
- CLAYEY SILT

NOTES:

1. STRATIGRAPHIC UNITS:
   - FILL– WELL TO POORLY GRADED SAND AND GRAVEL, CINDERS, BRICKS, LOOSE.
   - SWAMP– PEAT, LEAN CLAY, AND SILT, INTERBEDDED, PLASTIC, SOFT.
   - BEACH– WELL TO POORLY GRADED SAND, FINE TO MEDIUM GRAINED, SHELLS, LOOSE TO MEDIUM DENSE.
   - LAKE DEPOSITS– SILT TO CLAY, WITH OCCASIONAL SAND INTERBEDS, PLASTIC, SOFT TO MEDIUM STIFF.
2. BORING LOGS AND WELL CONSTRUCTION DETAILS ARE INCLUDED IN APPENDICES B & C. LINE OF GEOLOGIC CROSS SECTION SHOWN ON FIGURE 2.
3. ELEVATIONS BASED ON APRIL 23, 1992, RMT SURVEY.
4. CITY WELL No. 3 CASED FROM GROUND SURFACE TO 148 FEET BELOW GRADE.

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 10'

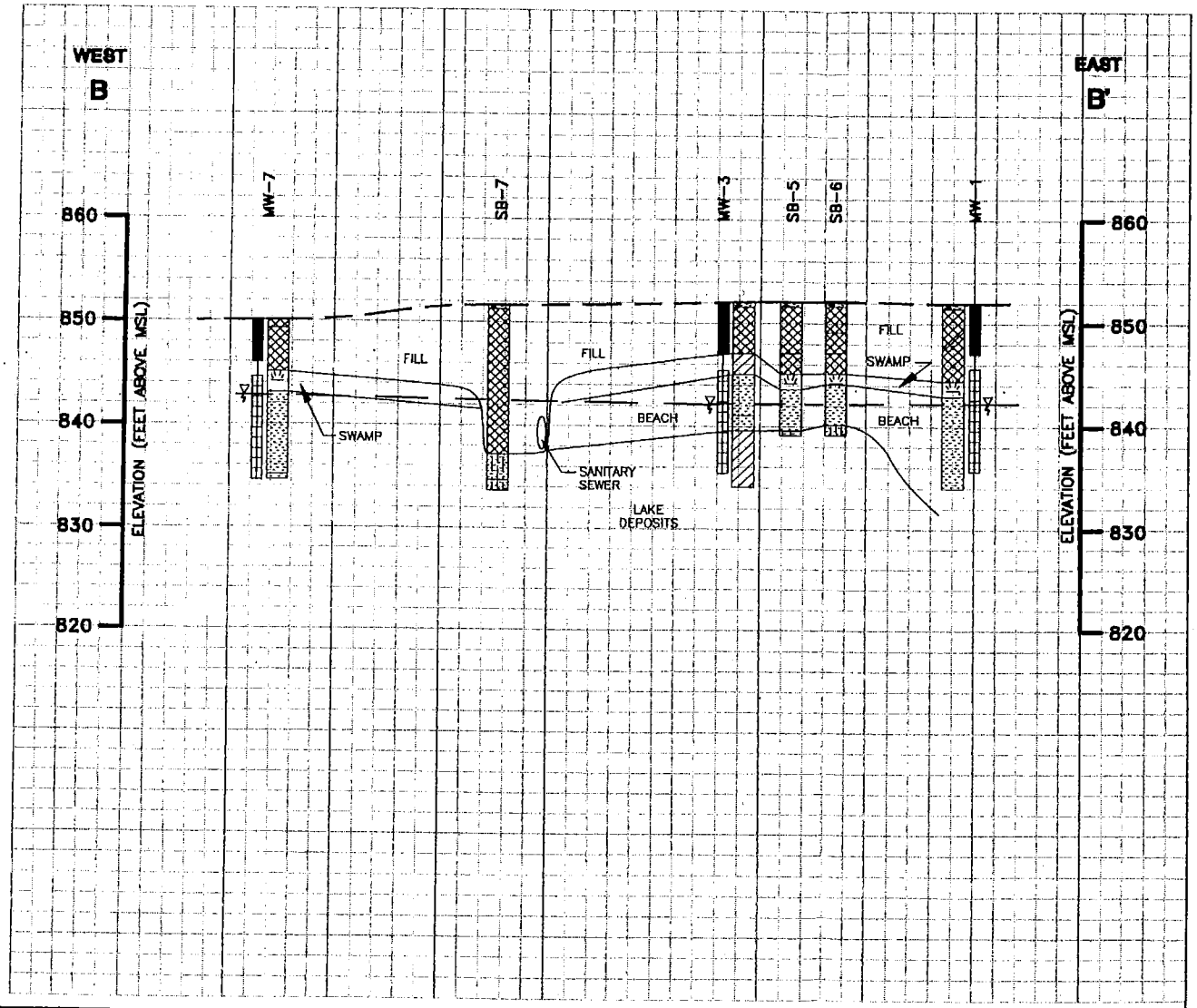
GEOLOGIC CROSS SECTION A-A'

FIRST STREET GARAGE
CITY OF MADISON
MADISON, WI

RMT, INC.

DWN. BY:	BLG
DATE:	JUNE 1992
PROJ.#	1908.06
FILE #	19080602

JUL 15 1992 FIGURE 3



LEGEND

- GROUND SURFACE
- STRATIGRAPHIC BOUNDARY
- WATER TABLE, MEASURED 5/16/92
- SEAL
- SCREENED INTERVAL
- FILL
- PEAT
- WELL TO POORLY SORTED SAND
- SILTY SAND
- SILT
- CLAY
- CLAYEY SAND
- CLAYEY SILT

NOTES:

1. STRATIGRAPHIC UNITS:
   - FILL– WELL TO POORLY GRADED SAND AND GRAVEL, CINDERS, BRICKS, LOOSE.
   - SWAMP– PEAT, LEAN CLAY, AND SILT, INTERBEDDED, PLASTIC, SOFT.
   - BEACH– WELL TO POORLY GRADED SAND, FINE TO MEDIUM GRAINED SAND, SHELLS, LOOSE TO MEDIUM DENSE.
   - LAKE DEPOSITS– SILT TO CLAY, WITH OCCASIONAL SAND INTERBEDS, PLASTIC, SOFT TO MEDIUM STIFF.
2. BORING LOGS AND WELL CONSTRUCTION DETAILS INCLUDED IN APPENDICES B AND C. LINE OF GEOLOGIC CROSS SECTION SHOWN ON FIGURE 2.
3. ELEVATIONS BASED ON APRIL 23, 1992, RMT SURVEY.

HORIZONTAL SCALE: 1"=40'
VERTICAL SCALE: 1"=10'

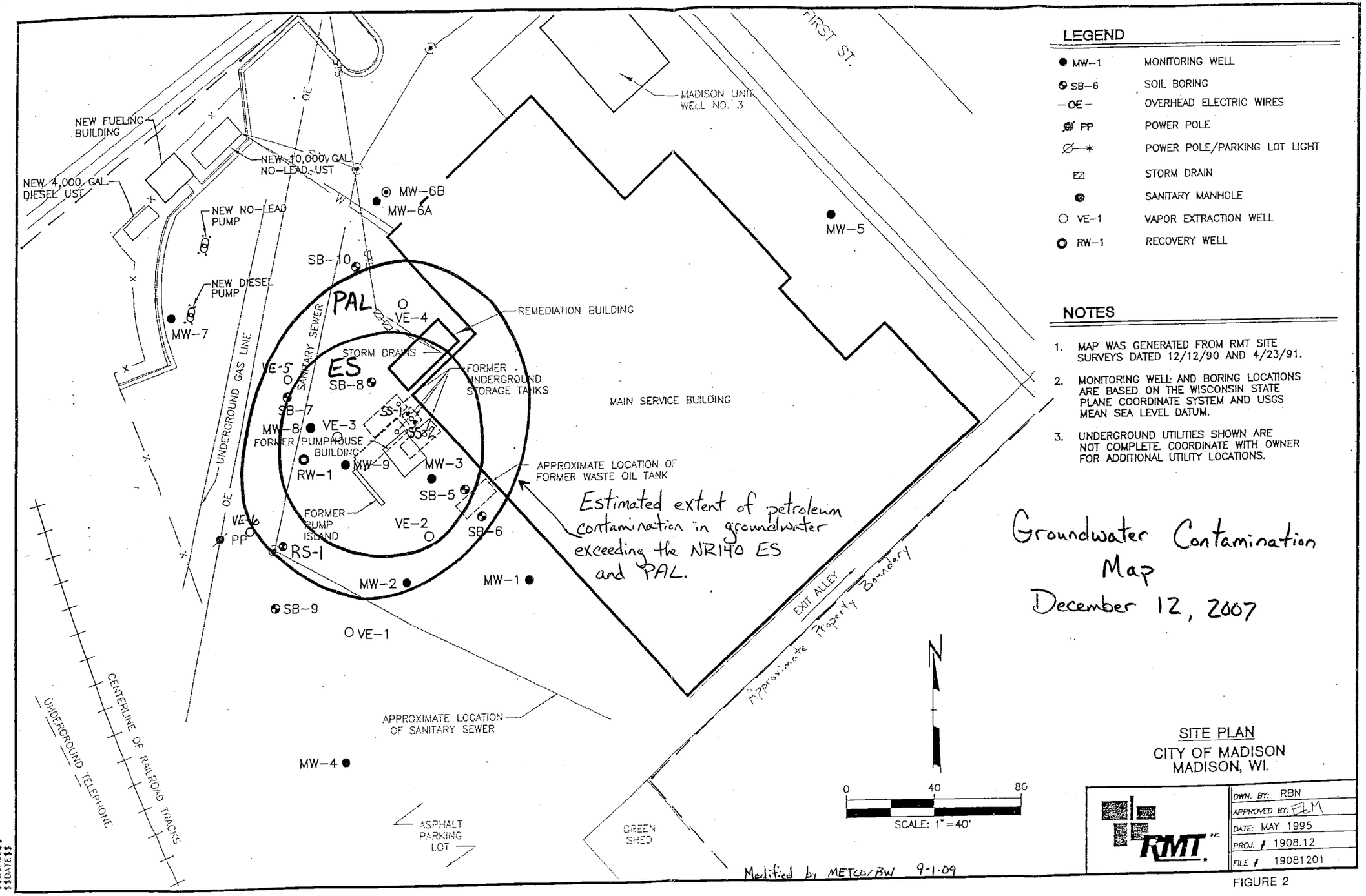
GEOLOGIC CROSS SECTION B-B'

FIRST STREET GARAGE
CITY OF MADISON
MADISON, WI

RMT, INC.

DWN. BY:	BLG
DATE:	JUNE 1992
PROJ.#	1908.06
FILE #	19080603

JUL 15 1992 FIGURE 4



LEGEND

● MW-1	MONITORING WELL
⊙ SB-6	SOIL BORING
—OE—	OVERHEAD ELECTRIC WIRES
PP	POWER POLE
∅—✳	POWER POLE/PARKING LOT LIGHT
	STORM DRAIN
	SANITARY MANHOLE
○ VE-1	VAPOR EXTRACTION WELL
◎ RW-1	RECOVERY WELL

NOTES

1. MAP WAS GENERATED FROM RMT SITE SURVEYS DATED 12/12/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND USGS MEAN SEA LEVEL DATUM.
3. UNDERGROUND UTILITIES SHOWN ARE NOT COMPLETE. COORDINATE WITH OWNER FOR ADDITIONAL UTILITY LOCATIONS.

Groundwater Contamination Map
December 12, 2007

SITE PLAN
CITY OF MADISON
MADISON, WI.

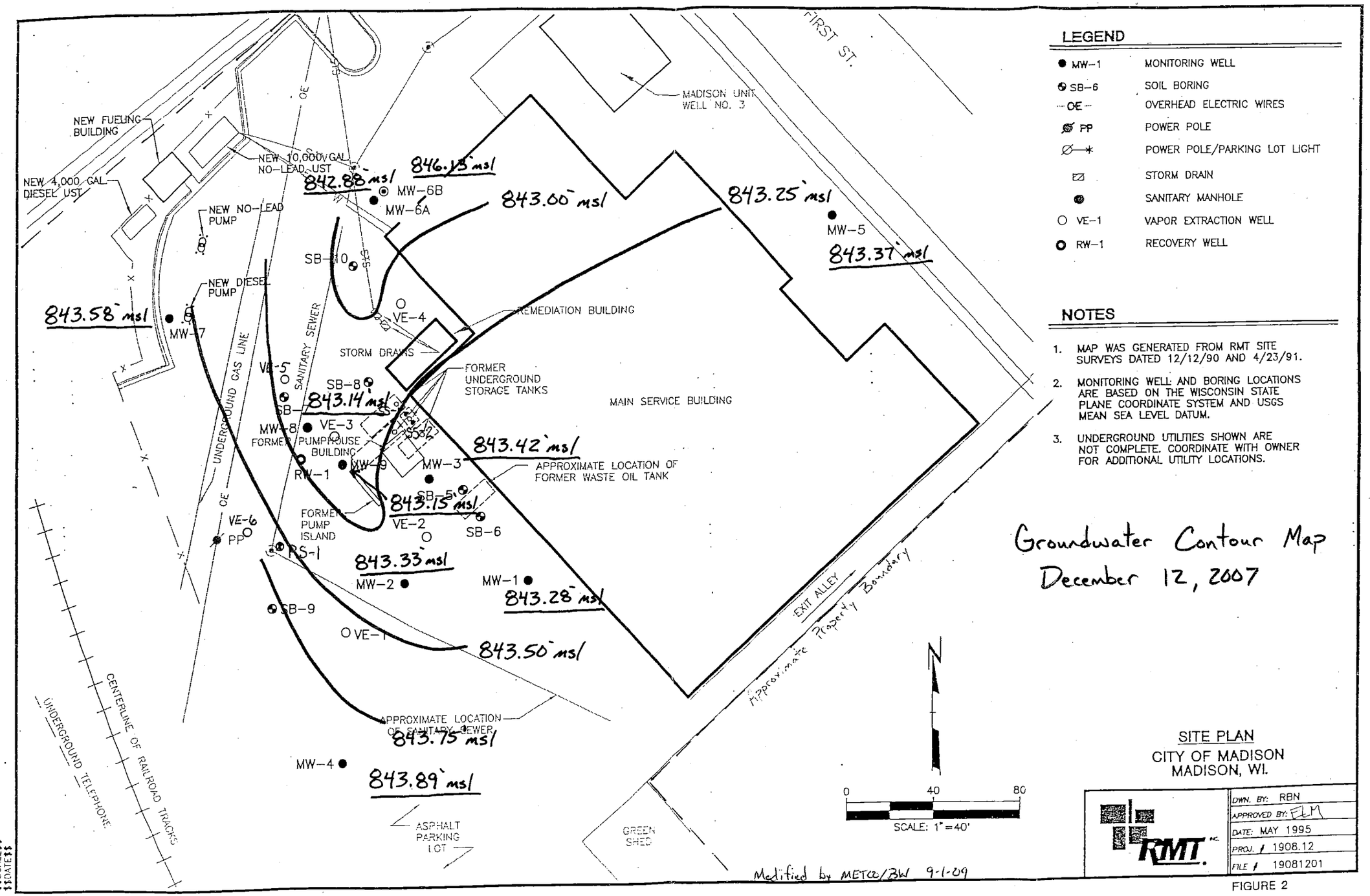
Modified by METCO/BW 9-1-09

RMT, INC.

DWN. BY:	RBN
APPROVED BY:	ELM
DATE:	MAY 1995
PROJ. #	1908.12
FILE #	19081201

FIGURE 2

DWGS
PRF$$
$$SCALE$$
$$DATE$$



LEGEND

● MW-1	MONITORING WELL
⊕ SB-6	SOIL BORING
OE	OVERHEAD ELECTRIC WIRES
PP	POWER POLE
	POWER POLE/PARKING LOT LIGHT
	STORM DRAIN
	SANITARY MANHOLE
○ VE-1	VAPOR EXTRACTION WELL
◎ RW-1	RECOVERY WELL

NOTES

1. MAP WAS GENERATED FROM RMT SITE SURVEYS DATED 12/12/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND USGS MEAN SEA LEVEL DATUM.
3. UNDERGROUND UTILITIES SHOWN ARE NOT COMPLETE. COORDINATE WITH OWNER FOR ADDITIONAL UTILITY LOCATIONS.

Groundwater Contour Map
December 12, 2007

Modified by METco/BW 9-1-09

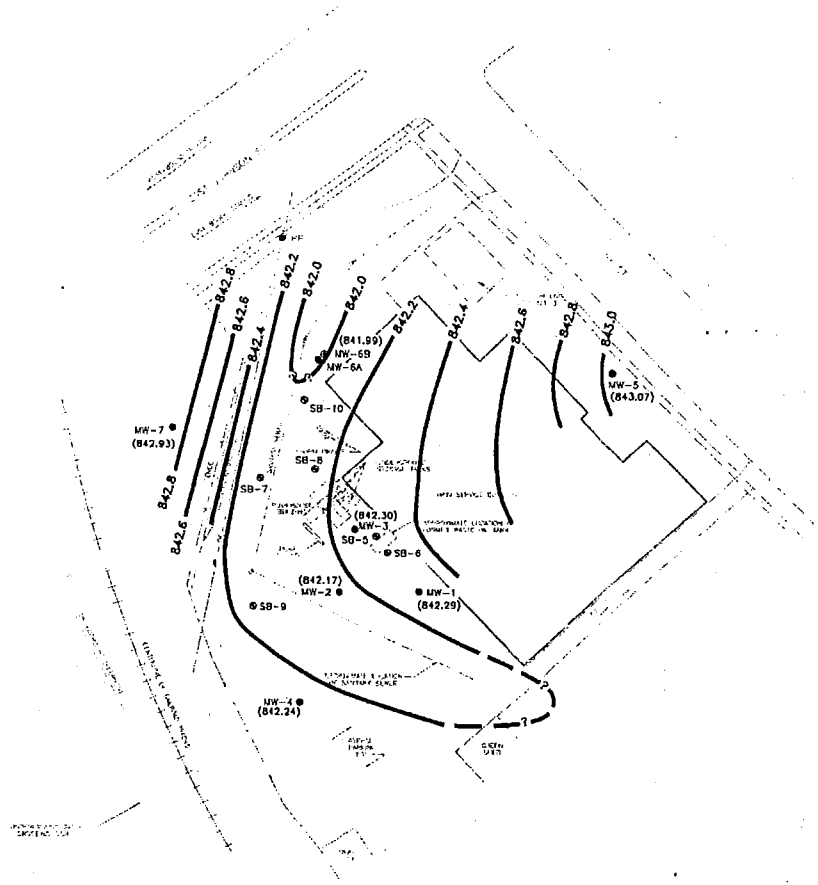
SITE PLAN
CITY OF MADISON
MADISON, WI.

RMT INC.

DWN. BY:	RBN
APPROVED BY:	ELM
DATE:	MAY 1995
PROJ. #	1908.12
FILE #	19081201

FIGURE 2

DWG:
APPR:
SCALE:
DATE:



LEGEND

- MW-1 — EXISTING MONITORING WELL
- SB-6 — EXISTING BORING
- OE — OVERHEAD ELECTRIC WIRES
- PP — POWER POLE
- PP/L — POWER POLE/PARKING LOT LIGHT
- SD — STORM DRAIN
- SAN — SANITARY MANHOLE
- (841.24) — WATER TABLE ELEVATION (5/19/92)
- 842.2 — WATER TABLE CONTOUR

NOTES

1. MAP WAS GENERATED FROM RMT SITE SURVEYS DATED 11/15/90 AND 4/23/91.
2. MONITORING WELL AND BORING LOCATIONS ARE BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM AND USGS MEAN SEA LEVEL DATUM.

N

0 40 80
SCALE: 1"=40'

NOTE: STAFF GAGE #1 IS LOCATED APPROXIMATELY 1,100' SOUTHSOUTHWEST OF THE INTERSECTION OF JOHNSON AND FIRST STREETS ON THE RAILROAD BRIDGE OVER THE YAHARA RIVER.

(844.97)

NO.	BY	DATE	REVISION	APPR.
3.				
2.				
1.				

PROJECT: FIRST STREET GARAGE
CITY OF MADISON
MADISON, WI

SHEET TITLE: WATER TABLE
MAY 19, 1992

Drawn By: BRC/BLG	SCALE: 1"=40'	PROJ. NO. 1808.04
CHECKED BY: RJK		DRWG. NO. 1808.04-1
APPROVED BY: RJK	DATE PRINTED: JUL 16 1992	FILE NO. 1808404
DATE: JUNE 1992		SHEET FIGURE 8

RMT, INC
742 Horizon Road
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444

TABLE 4-4

RESULTS OF CHEMICAL ANALYSES OF SOIL SAMPLES

Location	Sample Interval (depth in ft)	Concentrations (µg/kg)							
		Benzene	Toluene	Ethylbenzene	Xylenes	Methylene chloride	Tetrachloroethylene	Lead	TPH-Diesel
B-1	7 - 9	470	110	< 55	< 165	500	68	NA	NA
B-2	7 - 9	< 1.0	1.0	< 1.0	< 3.0	1.8	0.89	NA	NA
MW-1	7 - 9 9 - 11	< 0.98 < 1.1	3.3 7.0	< 0.98 < 1.1	< 2.9 < 3.4	< 0.98 < 1.1	< 2.0 < 2.3	NA NA	< 10,000 < 10,000
MW-2	5 - 7 7 - 9	8,300 < 1.0	8,100 < 1.0	< 1,300 < 1.0	< 3,900 < 3.1	< 1,300 < 1.0	< 2,600 < 2.1	NA NA	11,400* NA
MW-3	5 - 7 7 - 9	2,400 < 940	930 10,000	210 15,000	1,100 72,000	< 63 < 940	< 130 < 1,900	NA NA	1,450,000 27,900*
MW-4	5 - 7 7 - 9	9.2 < 0.99	43 13	< 2.7 1.5	< 8.0 5.2	< 2.7 < 0.99	< 5.4 < 2.0	NA NA	< 10,000 < 10,000
SB-5	7 - 9 9 - 11	53,000 < 4.0	22,000 52	50,000 < 4.0	110,000 < 12	< 1,800 < 4.0	< 3,500 < 8.0	NA < 20,000	NA < 10,000
SB-6	7 - 9 9 - 11	< 4.5 < 4.7	14 < 4.7	30 39	170 300	< 4.5 < 4.7	< 9.0 < 9.5	NA NA	NA 12,100*

Notes:

1) Samples were analyzed for VOCs using EPA Methods 8010 and 8020, for TPH-diesel using the "California Method," for lead using EPA Method 239.2, and for SVOCs using EPA Method 8270. No SVOCs were encountered at concentrations exceeding the Method Detection Limit.

2) Laboratory reports are included in Appendix H.

3) NA means not analyzed.

4) Soil samples from borings B-1 and B-2 were collected in July 1990; all other samples were collected during November 1990.

* Unknown hydrocarbons are present.

TABLE 4-5

FIELD-SCREENING RESULTS

Depth (feet)	Boring Number					
	MW-1	MW-2	MW-3	MW-4	SB-5	SB-6
1 - 3	15	100	220	6	100	50
3 - 5	40	120	190	8	150	100
5 - 7	250	160	170	30	30	50
7 - 9	250	190	500	100	200	200
9 - 11	100	150	300	30	300	120
11 - 12.5	5	200	300	5	300	50
13.5 - 15	2	100	130	10	NS	NS
16 - 17.5	< 2	150	100	8	NS	NS

Notes:

1) Results are reported in ppm-v in headspace over soil sample using an Hnu photoionization detector with an 11.7 eV lamp calibrated to an isobutylene standard gas.

2) NS means not sampled.

3) Hnu readings were collected using the method outlined in Appendix D.

TABLE 1

PHYSICAL ANALYSES OF SOIL SAMPLES
CITY OF MADISON - FIRST STREET GARAGE

Sample Location	Sample Depth	% Gravel	% Sand	% Silt	% Clay	P 200	Plastic Limit	Liquid Limit	Plasticity Index	USCS
MW-6B	8.5 - 10.5	0.0	94.8	2.5	2.7	NA	NP	NP	NP	SP - SM
MW-6B	29 - 31	NA	NA	NA	NA	96.7	15	29	14	CL
MW-7	13.5 - 15.5	0.0	71.8	24.1	4.1	NA	NP	NP	MP	SM

Notes:

1. NA = Not analyzed; NP = Nonplastic; USCS = Unified Soil Classification System.
2. Laboratory reports are included in Appendix B.

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TABLE 5
FIELD-SCREENING RESULTS
CITY OF MADISON - FIRST STREET GARAGE

Location	Depth (feet below grade)	PID Reading (Instrument Units)
MW-5	1 - 3	< 2
	3.5 - 5.5	< 2
	6 - 8	< 2
	8.5 - 10.5	< 2
	11 - 13	< 2
	13.5 - 15.5	< 2
	16 - 18	< 2
MW-6B	1 - 3	< 2
	3.5 - 7.5	18.5
	8.5 - 10.5	15.0
	11 - 13	8.5
	13.5 - 15.5	< 2
	16 - 18	< 2
	18.5 - 20.5	< 2
	21 - 23	< 2
	26 - 28	< 2
	29 - 31	< 2
	36 - 38	< 2
	40.5 - 42.5	< 2
MW-7	1 - 3	< 2
	3.5 - 5.5	< 2
	6 - 8	< 2
	8.5 - 10.5	< 2
	11 - 13	< 2
	13.5 - 15.5	< 2
SB-7	1 - 3	55
	3.5 - 5.5	75
	6 - 8	80
	8.5 - 10.5	90
	11 - 13	180
	13.5 - 15.5	190
	16 - 18	200
SB-8	1 - 3	115
	3.5 - 5.5	165
	6 - 8	120
	8.5 - 10.5	170
	11 - 13	154
	13.5 - 15.5	26
	16 - 18	130
	18.5 - 20.5	200
SB-9	1 - 3	9
	3.5 - 5.5	80
	6 - 8	65
	8.5 - 10.5	20
	11 - 13	< 2
	13.5 - 15.5	< 2
	16 - 18	< 2
	18.5 - 20.5	< 2
SB-10	1 - 3	58
	3.5 - 5.5	45
	6 - 8	105
	8.5 - 10.5	250
	11 - 13	170
	13.5 - 15.5	150
	16 - 18	100
	18.5 - 20.5	90

Note: 1. The photoionization detector (PID) provides an indirect indication of the levels of VOCs which may be present in the soil. The PID primarily indicates the relative differences in the readings between samples. PID scans were performed in the field by RMT personnel using the methods outlined in Appendix A.

1908.06 0000:RTE:firs0518.t

TABLE 6

SUMMARY OF CHEMICAL ANALYSES OF SOILS
APRIL 1992
CITY OF MADISON - FIRST STREET GARAGE

Sample Location	Depth (Feet Below Grade)	Concentration (mg/kg dry weight)										
		Cadmium	Lead	TPH Gasoline	TPH Diesel	Methyl-tert butyl ether	Benzene	Toluene	Ethyl-benzene	Xylenes	1,3,5-Trimethyl Benzene	1,2,4-Trimethyl Benzene
MW-5	6 to 8	0.089	65	< 12	60	< 0.0025F	< 0.0025F	< 0.0025F	< 0.0025F	< 0.0075F	< 0.0025F	< 0.0025F
MW-6	6 to 8	0.03	73	< 8.4	< 10	< 0.0017F	< 0.0017F	< 0.0017F	< 0.0051F	< 0.0017F	< 0.0017F	< 0.0017F
MW-7	6 to 8	< 0.075	< 0.75	< 7.3	< 10	0.0045	0.0056	0.0012	< 0.0015	< 0.0045	< 0.0015	< 0.0015
SB-7	13.5 to 15.5	0.086	8.2	54	60	< 0.10	0.13	1.6	0.63	2.9	0.40	1.5
SB-7DUP	13.5 to 15.5	NA	NA	NA	NA	< 0.56	1.1	14	5.0	23	10	11
SB-8	8.5 to 10.5	< 0.070	2.4	24000	9100	< 110	< 110	730	80	920	< 100	420
SB-9	3.5 to 5.5	0.55	130	< 53	14	0.0019F	0.0013F	< 0.0011F	< 0.0011F	< 0.0033F	< 0.0011F	< 0.0011F
SB-10	8.5 to 10.5	0.089	3.3	< 5.1	< 10	0.0013	0.0034	0.012	< 0.001	0.016	< 0.001	0.0016

Notes:

1. Laboratory data sheets included in Appendix H.
2. TPH = total petroleum hydrocarbons, NA = not analyzed, F = Repeated surrogate failure.

First Street Garage Geoprobe Investigation January 29, 2001	
GROUNDWATER	
COMPOUND (ug/L)	WS-1
Benzene	15000
Ethylbenzene	3100
Isopropylbenzene	100
n-Propylbenzene	320
Naphthalene	1100
Toluene	16000
Xylenes	15700
1,2,4 TMB	2900
1,3,5 TMB	770

SOIL		
COMPOUNDS (ug/kg)	SS-1	SS-2
Benzene	<280	<57
Ethylbenzene	3600	180
Isopropylbenzene	390	<57
n-Propylbenzene	1300	<57
p-Isopropyltoluene	650	<57
s-Butylbenzene	510	<57
Naphthalene	6100	1200
Toluene	6500	850
Xylenes	87000	17400
1,2,4 TMB	66000	11000
1,3,5 TMB	30000	20000

Groundwater Analytical Results Summary
First Street Garage LUST Site BRRT'S #03-13-000438

Well MW-1
PVC Elevation = 852.00 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
Dec-90	841.39	10.61	NS	**22**	<1.0	NS	NS	7.3	NS	<3.0
Apr-92	842.77	9.23	<100	*1.4*	<1.0	<1.0	NS	<1.0	<2.0	<3.0
Dec-93	841.55	10.45	NS	*1.3*	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Feb-95	840.92	11.08	NS	**5.1**	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Sep-95	841.00	11.00	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Dec-95	841.11	10.89	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Sep-96	841.85	10.15	WELL NOT SAMPLED - WATER LEVEL ONLY							
Dec-96	841.05	10.95	NS	<0.2	<0.68	<0.15	NS	<1.5	<2.0	<2.0
Mar-97	841.23	10.77	NS	<0.23	<0.26	<0.26	NS	<0.22	<0.84	<0.93
Jun-97	841.41	10.59	NS	(0.031)	<0.024	<0.0256	NS	<0.025	<0.0576	<0.080
Sep-97	841.60	10.40	NS	<0.11	<0.12	<0.24	NS	<0.11	<0.24	<0.36
Dec-97	840.62	11.38	NS	<0.36	<0.26	<0.24	NS	(0.78)	<0.50	<0.76
Mar-98	840.69	11.31	NS	<0.35	<0.39	<0.45	NS	<0.36	<0.91	<1.57
Jun-98	842.72	9.28	NS	<0.35	<0.39	<0.45	NS	<0.36	<0.91	<1.57
Sep-98	842.28	9.72	NS	<0.35	<0.39	<0.45	NS	<0.36	<0.92	<1.57
Dec-98	841.35	10.65	NS	<0.35	<0.39	<0.45	NS	<0.36	<0.91	<1.57
Mar-99	841.01	10.99	NS	<0.25	<0.32	<0.21	NS	<0.38	<1.00	<1.04
Jul-99	842.94	9.06	NS	<0.32	<0.34	<0.31	NS	<0.35	<0.99	<1.00
Sep-99	842.22	9.78	NS	<0.25	<0.32	<0.21	NS	<0.38	<0.70	<1.04
Dec-99	840.79	11.21	NS	<0.32	<0.34	<0.31	NS	<0.35	<0.99	<1.0
Jun-00	841.70	10.30	NS	<0.39	<0.40	<0.47	NS	<0.37	<1.03	<1.4
Sep-00	842.50	9.50	NS	<0.39	<0.40	<0.47	NS	<0.37	<1.03	<1.4
Dec-00	841.33	10.67	NS	<0.39	<0.40	<0.47	NS	<0.37	<1.03	<1.4
3/12/2007	842.58	9.42	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99
6/11/2007	843.84	8.16	NS	<0.22	<0.44	<0.53	NS	<0.26	<0.67	<1.21
9/10/2007	846.02	5.98	NS	<0.47	0.39	<0.52	NS	<0.46	10.40	3.13
12/12/2007	843.28	8.72	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99

Note: Bold type indicates an ES exceedance, *italics* indicates a PAL exceedance. NS = not sampled

Groundwater Analytical Results Summary
First Street Garage LUST Site BRRT'S #03-13-000438

Well MW-2
PVC Elevation = 851.81 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
Dec-90	NOT SAMPLED - FREE PRODUCT									
Apr-92	842.65	9.16	120000	**27000**	<1000	**21000**	NS	**25000**	<2000	**16000**
Dec-93	NOT SAMPLED - FREE PRODUCT									
Feb-95	NOT SAMPLED - FREE PRODUCT									
Sep-95	NOT SAMPLED - FREE PRODUCT									
Dec-95	841.08	10.73	NS	**19000**	**2500**	**28000**	NS	**10000**	**3230**	**13900**
Jun-96	843.96	7.85	NS	**11000**	**1900**	**5800**	NS	**16000**	**4200**	**15000**
Sep-96	841.99	9.82	NS	**7900**	**1500**	**6700**	NS	**1400**	**2980**	*6400*
Dec-96	841.12	10.69	NS	**9000**	**1400**	**8000**	NS	<1500	**1500**	<2000
Mar-97	841.46	10.35	NS	**11000**	**1400**	**15000**	NS	**2100**	(2940)	*5600*
Jun-97	841.39	10.42	NS	**15000**	**1400**	**9400**	NS	**2800**	**2800**	*9400*
Sep-97	841.59	10.22	NS	**11000**	**2500**	**5600**	NS	*820*	**2880**	*4330*
Dec-97	840.58	11.23	NS	**8900**	**3000**	**6300**	NS	**1600**	**5500**	*7200*
Mar-98	840.81	11.00	NS	**6600**	**2000**	**8100**	NS	**1600**	**2560**	*4700*
Jun-98	842.86	8.95	NS	**5700**	**2000**	**3100**	NS	**4200**	**5500**	**10400**
Sep-98	842.39	9.42	NOT SAMPLED - FREE PRODUCT							
Dec-98	841.46	10.35	NS	**4400**	**1500**	**2500**	NS	*350*	**1870**	*2250*
Mar-99	841.25	10.56	NS	**5400**	**1100**	**5000**	NS	*850*	**1230**	*2320*
Jul-99	843.14	8.67	NS	**3000**	**1200**	**850**	NS	**1400**	**3260**	*9000*
Sep-99	842.28	9.53	NS	**5400**	**2300**	**1500**	NS	*300*	**2830**	*5900*
Dec-99	840.78	11.03	NS	**2200**	**1600**	**2800**	NS	*360*	**1250**	*1500*
Jun-00	841.93	9.88	NS	**3400**	**710**	**3500**	NS	**1900**	**3350**	**10000**
Sep-00	842.42	9.39	NS	**2400**	*610*	**2100**	NS	**2000**	**3500**	*9500*
Dec-00	841.48	10.33	NS	**2700**	*480*	**3600**	NS	**1400**	**3460**	*8600*
3/12/2007	842.55	9.26	NS	**223**	*360*	**380**	NS	<23	1400-1418.5	480-496
6/11/2007	843.90	7.91	NS	**250**	*308*	**540**	NS	13.9	**1214**	*1137*
9/10/2007	846.04	5.77	NS	**220**	*283*	**214**	NS	10.5	**1151**	*1340*
12/12/2007	843.33	8.48	NS	*1.99*	3.05	5.8	NS	0.75	11.26	8.42

Note: Bold type indicates an ES exceedance, *italics* indicates a PAL exceedance. NS = not sampled

Groundwater Analytical Results Summary
First Street Garage LUST Site BRRT'S #03-13-000438

Well MW-3
PVC Elevation = 851.88 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
Dec-90	NOT SAMPLED - FREE PRODUCT									
Apr-92	842.62	9.26	120000	**22000**	**2400**	**28000**	NS	**26000**	**2300**	**13000**
Dec-93	NOT SAMPLED - FREE PRODUCT									
Feb-95	NOT SAMPLED - FREE PRODUCT									
Sep-95	NOT SAMPLED - FREE PRODUCT									
Dec-95	NOT SAMPLED - FREE PRODUCT									
Jun-96	843.77	8.11	NS	**4500**	**1000**	**2300**	NS	**5000**	**3200**	*9000*
Sep-96	841.84	10.04	NS	**7400**	**1900**	**3300**	NS	**2000**	**3320**	*9000*
Dec-96	841.08	10.80	NS	**11000**	**2000**	**4100**	NS	**5500**	**2500**	*9600*
Mar-97	841.38	10.50	NS	**11000**	**2800**	**4200**	NS	**4200**	**4400**	*9900*
Jun-97	841.46	10.42	NS	**10000**	**2800**	**2400**	NS	**1800**	**3440**	*7600*
Sep-97	841.58	10.30	NS	**6500**	**2300**	**2800**	NS	**3500**	**4400**	**14200**
Dec-97	840.73	11.15	NS	**7600**	**2200**	**2500**	NS	**3000**	**3010**	**10700**
Mar-98	NOT SAMPLED - FREE PRODUCT									
Jun-98	842.71	9.17	NS	**4400**	**1800**	**5200**	NS	**1400**	**3280**	**10300**
Sep-98	842.40	9.48	NS	**4800**	**1900**	**4400**	NS	**1400**	**770**	**11000**
Dec-98	841.42	10.46	NS	**5400**	**1900**	**3900**	NS	**1100**	**3050**	*8300*
Mar-99	841.11	10.77	NS	**6000**	**2200**	**4000**	NS	**1000**	**2900**	*9600*
Jul-99	842.92	8.96	NS	**4900**	**2400**	**3000**	NS	*950*	**3270**	**10000**
Sep-99	842.46	9.42	NS	**4100**	**2200**	**2100**	NS	*900*	**3760**	**10100**
Dec-99	840.84	11.04	NS	**5000**	**2300**	**3200**	NS	*800*	**3850**	**10000**
Jun-00	841.47	10.41	NS	**4100**	**1800**	**2600**	NS	*450*	**2830**	*7200*
Sep-00	842.58	9.3	NS	**3600**	*460*	**1400**	NS	**1300**	**4100**	*7000*
Dec-00	841.44	10.44	NS	**4400**	**710**	**1500**	NS	**1700**	**4000**	*7800*
3/12/2007	842.52	9.36	NS	**3700**	**1430**	**3500**	NS	*57*	**2690**	*3132*
6/11/2007	843.87	8.01	NS	**2260**	**840**	**2950**	NS	*73*	**1890**	*1901*
9/10/2007	846.14	5.74	NS	**2870**	*220*	**4500**	NS	*52*	**1230**	*1980*
12/12/2007	843.42	8.46	NS	**3090**	**940**	**4100**	NS	<46	**2030**	*1995*

Note: Bold type indicates an ES exceedance, *italics* indicates a PAL exceedance. NS = not sampled

Groundwater Analytical Results Summary
First Street Garage LUST Site BRRT'S #03-13-000438

Well MW-4
PVC Elevation = 851.40 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
Dec-90	841.62	9.78	NS	<1.0	<1.0	NS	NS	<1.0	NS	<3.0
Apr-92	843.13	8.27	<100	<1.0	<1.0	<1.0	NS	<1.0	<2.0	<3.0
Dec-93	841.73	WELL NOT SAMPLED - WATER LEVEL ONLY								
Feb-95	840.95	10.45	NS	<0.6	<1.0	<1.0	NS	<1.0	4.9	<2.0
Sep-95	840.95	10.45	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Dec-95	841.36	10.04	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
3/12/2007	843.15	8.25	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99
6/11/2007	844.43	6.97	NS	<0.22	<0.44	<0.53	NS	<0.26	<0.67	<1.21
9/10/2007	846.59	4.81	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99
12/12/2007	843.89	7.51	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99

Well MW-5
PVC Elevation = 853.39 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
Apr-92	843.55	9.84	NS	<1.0	<1.0	<1.0	NS	<1.0	<2.0	<3.0
Dec-93	842.33	11.06	WELL NOT SAMPLED - WATER LEVEL ONLY							
Feb-95	841.32	12.07	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Sep-95	841.47	11.92	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Dec-95	841.53	11.86	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Sep-96	842.13	11.26	WELL NOT SAMPLED - WATER LEVEL ONLY							
Dec-96	841.40	11.99	NS	<0.2	<0.68	<0.15	NS	<1.5	<1.9	<2.0
Mar-97	841.47	11.92	NS	<0.23	<0.26	<0.26	NS	<0.22	<0.64	<0.93
Jun-97	841.68	11.71	NS	(0.022)	<0.024	(0.030)	NS	(0.045)	<0.058	(0.080)
Sep-97	841.79	11.60	NS	<0.11	<0.12	<0.24	NS	<0.11	<0.24	<0.36
Dec-97	840.89	12.50	NS	<0.36	<0.26	<0.24	NS	<0.25	<0.50	<0.76
Mar-98	841.09	12.30	NS	<0.35	<0.39	<0.45	NS	<0.36	<0.91	<1.57
Jun-98	843.00	10.39	NS	<0.35	<0.39	<0.45	NS	<0.36	<0.91	<1.57
Sep-98	842.44	10.95	NS	<0.35	<0.39	<0.45	NS	<0.36	<0.92	<1.57
Dec-98	841.63	11.76	NS	<0.35	<0.39	<0.45	NS	<0.36	<0.91	<1.57
Mar-99	841.40	11.99	NS	<0.25	<0.32	<0.21	NS	<0.38	<1.00	<1.04
Jul-99	843.07	10.32	NS	<0.32	<0.34	<0.31	NS	<0.35	<0.99	<1.00
Sep-99	842.31	11.08	NS	<0.25	<0.32	<0.21	NS	<0.38	<0.70	<1.04
Dec-99	841.04	12.35	NS	<0.35	<0.34	<0.31	NS	<0.35	<0.99	<1.0
Jun-00	843.12	10.27	NS	<0.39	<0.40	<0.47	NS	<0.37	<1.03	<1.4
Sep-00	842.73	10.66	NS	<0.39	<0.40	<0.47	NS	<0.37	<1.03	<1.4
Dec-00	841.51	11.88	NS	<0.39	<0.40	<0.47	NS	<0.37	<1.03	<1.4
3/12/2007	843.18	10.21	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99
6/11/2007	844.10	9.29	NS	<0.22	<0.44	<0.53	NS	<0.26	<0.67	<1.21
9/10/2007	846.19	7.20	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99
12/12/2007	843.37	10.02	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99

Note: Bold type indicates an ES exceedance, *italics* indicates a PAL exceedance. NS = not sampled

Groundwater Analytical Results Summary
First Street Garage LUST Site BRRT'S #03-13-000438

Well MW-6A
PVC Elevation = 851.28 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
Apr-92	842.49	8.79	<100	<1.0	<1.0	3.2T	NS	<1.0	<2.0	<3.0
Dec-93	841.23	10.05	NS	*4.1*	<1.0	1.2	NS	<1.0	1.7	4.2
Feb-95	840.70	10.58	NS	230	28	18	NS	<1.0	42	210
Sep-95	840.81	10.47	NS	<0.6	<1.0	1.7	NS	<1.0	1.8	<2.0
Dec-95	840.83	10.45	NS	9.1	<1.0	6.9	NS	<1.0	<2.0	<2.0
Jun-96	843.49	7.79	NS	**280**	*470*	<5.0	NS	58	*469*	760
Sep-96	841.48	9.80	NS	**23**	**810**	<5.0	NS	127	**2800**	**10100**
Dec-96	840.85	10.43	NS	**2300**	**2300**	**100**	NS	**2100**	**2820**	**8700**
Mar-97	840.95	10.33	NS	**930**	**850**	**260**	NS	120	**1630**	**6400**
Jun-97	841.14	10.14	NS	**4300**	*210*	**150**	NS	22	*114*	167
Sep-97	841.25	10.03	NS	**1000**	**1000**	**240**	NS	*280*	*367*	*2140*
Dec-97	840.48	10.80	NS	**3100**	**970**	**510**	NS	*370*	**610**	*1670*
Mar-98	840.54	10.74	NS	**2300**	*420*	**230**	NS	*260*	*220*	*1020*
Jun-98	842.25	9.03	NS	**19**	110	<4.5	NS	<3.6	*367*	169
Sep-98	842.00	9.28	NS	(5.0)	100	<4.5	NS	<0.36	**1680**	221
Dec-98	841.07	10.21	NS	(8.2)	100	64	NS	(7.8)	**1287**	100
Mar-99	840.72	10.56	NS	**2300**	*370*	**280**	NS	36	*478*	*1110*
Jul-99	842.48	8.80	NS	*2.7*	*160*	<0.31	NS	(0.87)	*411*	339
Sep-99	841.85	9.43	NS	*1.3*	110	<0.21	NS	(0.65)	**940**	280
Dec-99	840.58	10.70	NS	**73**	*160*	*24*	NS	23	**1130**	*1000*
Jun-00	842.06	9.22	NS	<0.69	<0.4	<0.47	NS	(0.56)	<1.03	<1.4
Sep-00	843.02	8.26	NS	(1.2)	<0.4	<0.47	NS	(0.73)	2.2	<1.4
Dec-00	841.45	9.83	NS	<3.9	<4	<4.7	NS	<3.7	**1070**	430
3/12/2007	842.39	8.89	NS	*0.85*	<0.38	*16.7*	NS	<0.46	<1.57	<0.99
6/11/2007	843.45	7.83	NS	0.39	<0.44	*12.6*	NS	0.35	<0.67	<1.21
9/10/2007	845.61	5.67	NS	<0.47	<0.38	0.99	NS	<0.46	<1.57	<0.99
12/12/2007	842.88	8.40	NS	<0.47	<0.38	11.9	NS	<0.46	<1.57	<0.99

Note: Bold type indicates an ES exceedance, *italics* indicates a PAL exceedance. NS = not sampled

Groundwater Analytical Results Summary
First Street Garage LUST Site BRRT'S #03-13-000438

Well MW-6B
PVC Elevation = 851.15 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
Apr-92	843.05	8.10	160	<5.0	<5.0	<5.0	NS	120	<10.0	<15
Dec-93	842.48	8.67	NS	<1.0	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Feb-95	841.52	9.63	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Sep-95	840.68	10.47	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Dec-95	841.73	9.42	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Jun-96	843.92	7.23	NS	<0.7	<0.7	<0.5	NS	<1.0	<1.9	<2.0
Sep-96	841.80	9.35	NS	<0.7	<0.7	<0.5	NS	<1.0	<1.9	<2.0
Dec-96	841.79	9.36	NS	<0.2	<0.68	<0.15	NS	<1.5	<1.9	<2.0
Mar-97	841.62	9.53	NS	**26**	7.2	*35*	NS	<0.55	2.6	7.1
Jun-97	841.39	9.76	NS	**22**	5.3	*29*	NS	<0.55	3.5	9.3
May-97	NM	NM	NS	0.38	0.33	<0.25	NS	(0.058)	(0.11)	<0.080
Sep-97	840.26	10.89	NS	**91**	26	**430**	NS	10	21	25
Dec-97	840.87	10.28	NS	**22**	(1.8)	**150**	NS	(1.5)	2.6	3.8
Mar-98	840.98	10.17	NS	<1.8	<1.9	**76**	NS	<1.8	<4.6	<7.9
Jun-98	843.25	7.90	NS	*3.3*	<0.78	9.3	NS	<0.71	1.82	<3.13
Sep-98	839.44	11.71	NS	<0.35	(0.68)	3	NS	<0.36	9.5	(1.6)
Dec-98	841.29	9.86	NS	<0.35	<0.39	4.1	NS	<0.36	<0.92	<1.57
Mar-99	841.21	9.94	NS	*2.5*	<0.32	**150**	NS	<0.38	<1.00	<1.04
Jul-99	842.45	8.70	NS	<0.32	<0.34	6	NS	<0.35	<0.99	<1.00
Sep-99	839.50	11.65	NS	<0.25	<0.32	4.2	NS	<0.38	<0.70	<1.04
Dec-99	840.81	10.34	NS	**68**	8.1	*32*	NS	2.5	2.2	26
Jun-00	843.75	7.40	NS	<0.39	<0.40	4	NS	<0.37	<1.03	<1.4
Sep-00	843.07	8.08	NS	<0.39	<0.40	3.1	NS	<0.37	<1.03	<1.4
Dec-00	841.67	9.48	NS	<0.39	<0.40	(1.3)	NS	<0.37	<1.03	<1.4
3/12/2007	844.85	6.30	NS	<0.47	<0.38	1.22	NS	<0.46	2.82	<1.24
6/11/2007	845.95	5.20	NS	0.24	<0.44	<0.53	NS	0.38	<0.67	<1.21
9/10/2007	846.52	4.63	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99
12/12/2007	846.13	5.02	NS	<0.47	<0.38	<0.52	NS	<0.46	<1.57	<0.99

Well MW-7
PVC Elevation = 850.29 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
4/23/1992	843.81	8.18	<100	<1.0	<1.0	<1.0	NS	<1.0	<2.0	<3.0
12/20/1993	842.07	8.22	NS	<1.0	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Feb-95	COULD NOT LOCATE									
Sep-95	841.86	8.43	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
Dec-95	841.97	8.32	NS	<0.6	<1.0	<1.0	NS	<1.0	<2.0	<2.0
3/12/2007	843.35	6.94	NS	<0.47	1.2	<0.52	NS	<0.46	0.61-1.81	2.68
6/11/2007	844.53	5.76	NS	0.25	<0.44	<0.53	NS	0.37	0.309-0.759	<1.21
9/10/2007	846.34	3.95	NS	<0.47	35	<0.52	NS	11.00	*313*	273
12/12/2007	843.58	6.71	NS	<0.47	3.9	<0.52	NS	<0.46	32.9	12.8

Note: Bold type indicates an ES exceedance, *italics* indicates a PAL exceedance. NS = not sampled

Groundwater Analytical Results Summary
First Street Garage LUST Site BRRT'S #03-13-000438

Well MW-8
PVC Elevation = 851.15 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
Dec-93	841.32	9.83	NS	**25000**	**1200**	**48000**	NS	**2600**	**700**	*2700*
Feb-95	NOT SAMPLED - FREE PRODUCT									
Sep-95	NOT SAMPLED - FREE PRODUCT									
Dec-95	840.97	10.18	NS	**920**	*550*	**130**	NS	*550*	*115*	490
Jun-96	843.75	7.40	NS	**550**	**1600**	*19*	NS	**1600**	*388*	*1500*
Sep-96	841.57	9.58	NS	**2100**	*308*	*42*	NS	*308*	*381*	350
Dec-96	840.97	10.18	NS	**2200**	*540*	*31*	NS	*540*	*190*	320
Mar-97	841.18	9.97	NS	**5200**	*550*	**79**	NS	*550*	*365*	*1030*
Jun-97	841.25	9.90	NS	**6300**	**720**	(28)	NS	**2800**	**490**	*1580*
Sep-97	841.45	9.70	NS	**2900**	*370*	<12	NS	**1200**	*410*	*1140*
Dec-97	840.51	10.64	NS	**2200**	*190*	**60**	NS	*320*	*171*	450
Mar-98	NOT SAMPLED - FREE PRODUCT									
Jun-98	842.63	8.52	NS	**1700**	*420*	<45	NS	*650*	**880**	*1490*
Sep-98	841.20	9.95	NOT SAMPLED - FREE PRODUCT							
Dec-98	841.21	9.94	NS	**2100**	*190*	<45	NS	*510*	(225)	520
Mar-99	840.90	10.25	NS	**2200**	*280*	*22*	NS	*620*	*174*	880
Jul-99	842.81	8.34	NS	**940**	*290*	(4.2)	NS	120	(330)	330
Sep-99	842.13	9.02	NS	**2100**	*330*	*24*	NS	*490*	*445*	640
Dec-99	840.69	10.46	NS	**620**	39	*21*	NS	35	44	85
Jun-00	842.35	8.80	NS	**580**	*600*	<47	NS	*2100*	(810)	*3900*
Sep-00	842.34	8.81	NS	**16**	*270*	2	NS	46	*359.3*	620
Dec-00	841.22	9.93	NS	**47**	*570*	<4.7	NS	60	**843**	*2200*
3/12/2007	844.45	6.70	NS	**450**	39	**650**	NS	<9.2	<31.4	50.6
6/11/2007	843.72	7.43	NS	**225**	27.9	**236**	NS	3.50	25.4-27.6	80-85.3
9/10/2007	846.09	5.06	NS	*0.50*	<0.38	<0.52	NS	<0.46	<1.57	<0.99
12/12/2007	843.14	8.01	NS	**600**	22.7	**390**	NS	5.4	143	286.9

Note: Bold type indicates an ES exceedance, *italics* indicates a PAL exceedance. NS = not sampled

Groundwater Analytical Results Summary
First Street Garage LUST Site BRRT'S #03-13-000438

Well MW-9
PVC Elevation = 851.64 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
Dec-93	NOT SAMPLED - FREE PRODUCT									
Feb-95	NOT SAMPLED - FREE PRODUCT									
Sep-95	NOT SAMPLED - FREE PRODUCT									
Dec-95	841.05	10.59	NS	**32000**	**1900**	**150000**	NS	**2600**	<2000	*3700*
Jun-96	843.54	8.10	NS	**15000**	**990**	**43000**	NS	**3400**	**1800**	*5500*
Sep-96	841.48	10.16	NS	**19000**	**1600**	**65000**	NS	**6000**	**1400**	*6600*
Dec-96	840.89	10.75	NS	**25000**	**2000**	**65000**	NS	**3500**	**1100**	*6300*
Mar-97	841.21	10.43	NS	**19000**	**3000**	**75000**	NS	**3000**	**4300**	**17600**
Jun-97	841.26	10.38	NS	**23000**	**1900**	**59000**	NS	**1800**	**1560**	*5600*
Sep-97	841.34	10.30	NS	**16000**	**1900**	**51000**	NS	**1700**	**2100**	*6400*
Dec-97	840.15	11.49	NS	**15000**	**1700**	**44000**	NS	**2700**	**2960**	**10100**
Mar-98	840.68	10.96	NS	**18000**	**2200**	**45000**	NS	**1600**	**2900**	*6800*
Jun-98	842.45	9.19	NS	**8300**	**2000**	**25000**	NS	**2300**	**3500**	*7600*
Sep-98	842.14	9.50	NS	**6900**	(720)	**24000**	NS	**1800**	(440)	*7800*
Dec-98	841.09	10.55	NS	**15000**	**1400**	**38000**	NS	<360	(1820)	(4060)
Mar-99	840.79	10.85	NS	**15000**	**1400**	**30000**	NS	(86)	(1150)	*3760*
Jul-99	842.85	8.79	NS	**10000**	**880**	**20000**	NS	**1300**	**2740**	**12000**
Sep-99	842.17	9.47	NS	**4500**	**790**	**8600**	NS	*340*	**2590**	**10400**
Dec-99	840.69	10.95	NS	**15000**	**1200**	**30000**	NS	(110)	(670)	*2400*
Jun-00	842.01	9.63	NS	**19000**	**2200**	**13000**	NS	**1000**	(1500)	*4800*
Sep-00	842.30	9.34	NS	**16000**	**1600**	**4700**	NS	**2600**	**1100**	*4000*
Dec-00	841.22	10.42	NS	**4500**	530	**2400**	NS	(140)	*310*	*1000*
3/12/2007	842.42	9.22	NS	**1210**	96	**2550**	NS	<23	*122.5*	208-224
6/11/2007	843.71	7.93	NS	**710**	68	**1220**	NS	12.2	89.8	149.9
9/10/2007	846.01	5.63	NS	**1220**	65	**2430**	NS	<23	93-111.5	178-194
12/12/2007	843.15	8.49	NS	**1660**	70	**2340**	NS	<23	*163.5*	248-264

Well RW-1
PVC Elevation = 849.98 (ft) (MSL)

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
12/17/1996	833.89	16.09	NOT SAMPLED							
3/6/1997	841.39	8.59	NOT SAMPLED							
4/23/1997	834.33	15.65	NOT SAMPLED							
6/13/1997	841.50	8.48	NOT SAMPLED							
9/18/1997	832.64	17.34	NOT SAMPLED							
7/7/1999	842.97	7.01	NOT SAMPLED							
9/8/1999	842.12	7.86	NOT SAMPLED							

Geoprobe WS-1

Date	Water Elevation (in feet)	Depth to Water (in feet)	GRO (ppb)	Benzene (ppb)	Ethyl Benzene (ppb)	MTBE (ppb)	Naphthalene (ppb)	Toluene (ppb)	Trimethyl-benzenes (ppb)	Xylene (Total) (ppb)
1/29/2001	NM	NM	NS	**15000**	**3100**	NS	**1100**	**16000**	**3670**	**15700**

Note: Bold type indicates an ES exceedance, *italics* indicates a PAL exceedance. NS = not sampled

( ) = Values in parenthesis represents results greater than the limit of detection but less than the limit of quantitation
t= analyte detection not confirmed

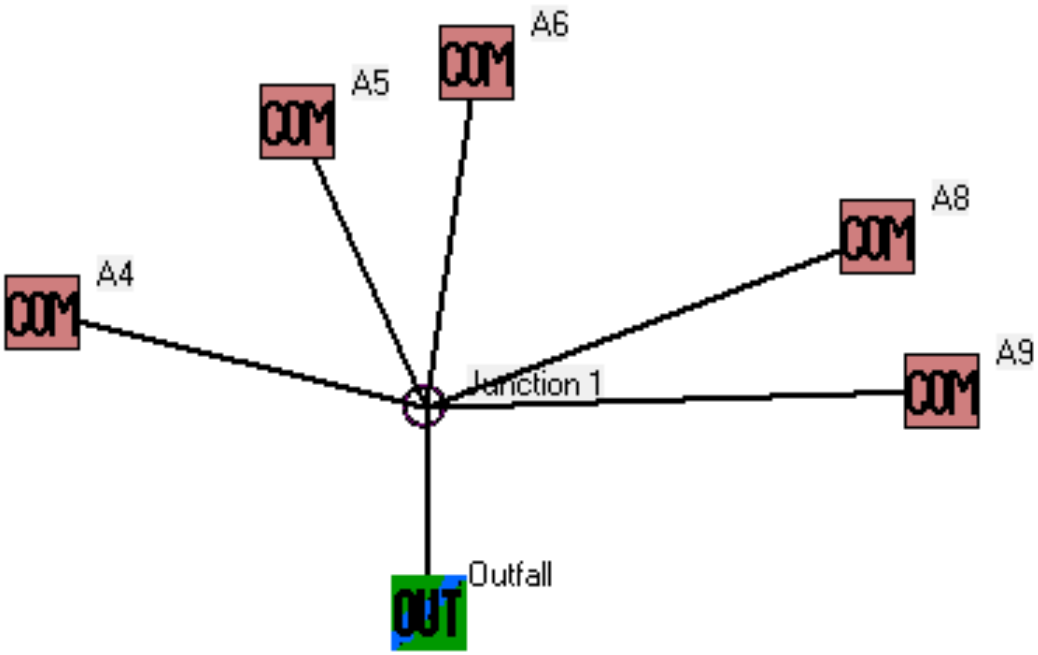
Watertable Elevation Table
First Street Garage LUST Site BRRT'S #03-13-000438
Madison, Wisconsin

	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6A	MW-6B	MW-7	MW-8	MW-9	RW-1
pvc top (ft)	852.00	851.81	851.88	851.40	853.39	851.28	851.15	850.29	851.15	851.64	849.98
Date											
Dec-90	841.39	FP	FP	841.62	NI	NI	NI	NI	NI	NI	NI
Apr-92	842.77	842.65	842.62	843.13	843.55	842.49	843.05	843.81	NI	NI	NI
Dec-93	841.55	FP	FP	841.73	842.33	841.23	842.48	842.07	841.32	FP	NI
Feb-95	840.92	FP	FP	840.95	841.32	840.70	841.52	CNL	FP	FP	NI
Sep-95	841.00	FP	FP	840.95	841.47	840.81	840.68	841.86	FP	FP	NI
Dec-95	841.11	841.08	FP	841.36	841.53	840.83	841.73	841.97	840.97	841.05	NI
Jun-96	NM	843.96	843.77	NM	844.26	843.49	843.92	NM	843.75	843.54	NI
Sep-96	841.85	841.99	841.84	NM	842.13	841.48	841.80	NM	841.57	841.48	NI
Dec-96	841.05	841.12	841.08	NM	841.40	840.85	841.79	NM	840.97	840.89	833.89
Mar-97	841.23	841.46	841.38	NM	841.47	840.95	841.62	NM	841.18	841.21	841.39
Jun-97	841.41	841.39	841.46	NM	841.68	841.14	841.39	NM	841.25	841.26	834.33
Sep-97	841.60	841.59	841.58	NM	841.79	841.25	840.26	NM	841.45	841.34	841.50
Dec-97	840.62	840.58	840.73	NM	840.89	840.48	840.87	NM	840.51	840.15	832.64
Mar-98	840.69	840.81	FP	NM	841.09	840.54	840.98	NM	FP	840.68	NM
Jun-98	842.72	842.86	842.71	NM	843.00	842.25	843.25	NM	842.63	842.45	NM
Sep-98	842.28	842.39	842.40	NM	842.44	842.00	839.44	NM	841.20	842.14	NM
Dec-98	841.35	841.46	841.42	NM	841.63	841.07	841.29	NM	841.21	841.09	NM
Mar-99	841.01	841.25	841.11	NM	841.40	840.72	841.21	NM	840.90	840.79	NM
Jul-99	842.94	843.14	842.92	NM	843.07	842.48	842.45	NM	842.81	842.85	842.97
Sep-99	842.22	842.28	842.46	NM	842.31	841.85	839.50	NM	842.13	842.17	842.12
Dec-99	840.79	840.78	840.84	NM	841.04	840.58	840.81	NM	840.69	840.69	NM
Jun-00	841.70	841.93	841.47	NM	843.12	842.06	843.75	NM	842.35	842.01	NM
Sep-00	842.50	842.42	842.58	NM	842.73	843.02	843.07	NM	842.34	842.30	NM
Dec-00	841.33	841.48	841.44	NM	841.51	841.45	841.67	NM	841.22	841.22	NM
03/12/07	842.58	842.55	842.52	843.15	843.18	842.39	844.85	843.35	844.45	842.42	NM
06/11/07	843.84	843.90	843.87	844.43	844.10	843.45	845.95	844.53	843.72	843.71	NM
09/10/07	846.02	846.04	846.14	846.59	846.19	845.61	846.52	846.34	846.09	846.01	NM
12/12/07	843.28	843.33	843.42	843.89	843.37	842.88	846.13	843.58	843.14	843.15	NM

Note: Elevations are presented in feet mean sea level (msl).
NM = Not Measured
FP = Free Product
No Acc = Not Accessible
NI = Not Installed
CNL = Could Not Locate

4.0 Sediment Reduction Calculations

Proposed Conditions – Loading from New Parking



Data file name: M:\MSR (Meyer, Scherer & Rockcastle Ltd)\180275_Madison Market\Design Development\Modeling\TSS Control\MPM No Controls - Parking Area Only.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 05-01-2020 Time: 10:23:02
Site information:

LU# 1 - Commercial: A8 Total area (ac): 0.077
  13 - Paved Parking 1: 0.077 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Commercial: A4 Total area (ac): 0.032
  13 - Paved Parking 1: 0.032 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Commercial: A6 Total area (ac): 1.191
  13 - Paved Parking 1: 1.191 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 4 - Commercial: A5 Total area (ac): 0.007
  13 - Paved Parking 1: 0.007 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

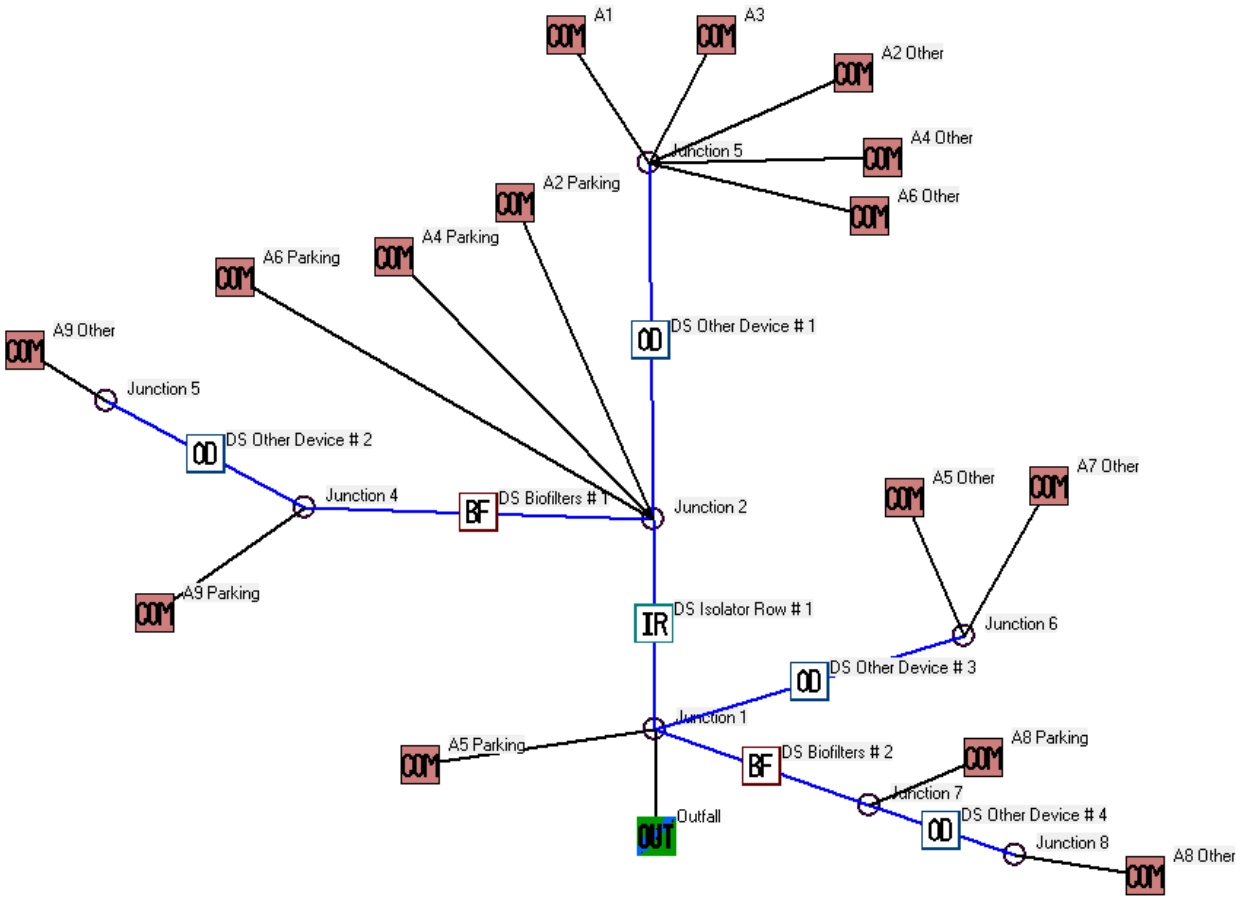
```
LU# 5 - Commercial:  A9     Total area (ac):  0.161
     13 - Paved Parking 1:  0.161 ac.    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
```

SLAMM for Windows Version 10.4.1

Data file name: M:\MSR (Meyer, Scherer & Rockcastle Ltd)\180275_Madison Market\Design Development\Modeling\TSS Control\MPM No Controls - Parking Area Only.mdb
Data file description:
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Start of Winter Season: 12/02 End of Winter Season: 03/12
Model Run Start Date: 01/01/81 Model Run End Date: 12/31/81
Date of run: 05-01-2020 Time of run: 09:46:40
Total Area Modeled (acres): 1.468
Years in Model Run: 1.00

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	111430	-	130.0	904.3	-
Outfall Total with Controls:	111428	0.00%	130.0	904.3	0.00%
Annualized Total After Outfall Controls:	111734			906.8	

Proposed Conditions – With Controls



Data File: M:\MSR (Meyer, Scheer & Rockcastle Ltd)\180275_Madison Market\Design Development\Modeling\TSS Control\MPM TSS Controls - Parking Area Only.mdb
Rain File: WisReg - Madison WI 1981.RAN
Date: 05-31-21 Time: 2:59:59 PM
Site Description:

Col. #:	2	3	4	5	6	7	8	9	10	11	12	13	14	15	18	19	27	28
Control Practice No.	Control Practice Type	Control Practice Name or Location	Total Inflow Volume (cf)	Total Outflow Volume (cf)	Percent Volume Reduction	Total Influent Load (lbs)	Total Effluent Load (lbs)	Percent Load Reduction	Flow Weighted Influent Conc (mg/L)	Flow Weighted Effluent Conc (mg/L)	Percent Conc. Reduction	Influent Median Part. Size (microns)	Effluent Median Part. Size (microns)	Notes	Maximum Stage (ft)	Hydraulic Volume Out (cf)	Maximum Surface Ponding Time (hrs)	Maximum Subsurface Ponding Time (hrs)
1	Isolator Row	DS Isolator Row # 1	200601	201113	-0.255	784.0	357.9	54.35	62.60	28.50	54.472	7.53	2.89	No Isolator Row Overflows	0.70			
2	Biofilter	DS Biofilters # 1	20509	20509	0	99.18	20.75	79.08	77.46	16.21	79.078	7.80	1.70	No Biofilter Overflows	2.83	20564	8.8	5.98
3	Other Device	DS Other Device # 1	86045	86045	0	491.3	0	100.0	91.46	0	100.000	7.80	7.80					
4	Other Device	DS Other Device # 2	8288	8288	0	33.32	0	100.0	64.40	0	100.000	7.80	7.80					
5	Other Device	DS Other Device # 3	20768	20768	0	103.4	0	100.0	79.78	0	100.000	7.80	7.80					
6	Biofilter	DS Biofilters # 2	8140	8140	0	47.43	9.870	79.19	93.35	19.42	79.192	7.80	1.71	No Biofilter Overflows	2.46	8161	5.8	5.40
7	Other Device	DS Other Device # 4	2295	2295	0	13.36	0	100.0	93.22	0	100.000	7.77	7.77					

Data file name: M:\MSR (Meyer, Scherer & Rockcastle Ltd)\180275_Madison Market\Design Development\Modeling\TSS Control\MPM TSS Controls - Parking Area Only.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 05-31-2021 Time: 14:51:27
Site information:

LU# 1 - Commercial: A1 Total area (ac): 1.004
  13 - Paved Parking 1: 0.245 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  31 - Sidewalks 1: 0.143 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  45 - Large Landscaped Areas 1: 0.616 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Commercial: A3 Total area (ac): 0.150
  13 - Paved Parking 1: 0.108 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  31 - Sidewalks 1: 0.004 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  45 - Large Landscaped Areas 1: 0.038 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

```
LU# 3 - Commercial:  A9 Parking     Total area (ac):  0.161
     13 - Paved Parking 1:  0.161 ac.    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz


LU# 4 - Commercial:  A2 Parking     Total area (ac):  0.016
     13 - Paved Parking 1:  0.016 ac.    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz


LU# 5 - Commercial:  A4 Parking     Total area (ac):  0.032
     13 - Paved Parking 1:  0.032 ac.    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz


LU# 6 - Commercial:  A6 Parking     Total area (ac):  1.191
     13 - Paved Parking 1:  1.191 ac.    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz


LU# 7 - Commercial:  A5 Parking     Total area (ac):  0.007
     13 - Paved Parking 1:  0.007 ac.    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz


LU# 8 - Commercial:  A8 Parking     Total area (ac):  0.077
     13 - Paved Parking 1:  0.077 ac.    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz


LU# 9 - Commercial:  A7 Other     Total area (ac):  0.366
     31 - Sidewalks 1:  0.265 ac.    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
     45 - Large Landscaped Areas 1:  0.101 ac.    Normal Silty    Source Area PSD File: C:\WinSLAMM
Files\NURP.cpz


LU# 10 - Commercial:  A2 Other     Total area (ac):  0.322
     1 - Roofs 1:  0.260 ac.    Flat    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
     45 - Large Landscaped Areas 1:  0.062 ac.    Normal Silty    Source Area PSD File: C:\WinSLAMM
Files\NURP.cpz


LU# 11 - Commercial:  A4 Other     Total area (ac):  0.016
     31 - Sidewalks 1:  0.003 ac.    Connected    Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
```

45 - Large Landscaped Areas 1: 0.013 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 12 - Commercial: A6 Other   Total area (ac): 0.449
1 - Roofs 1: 0.011 ac.   Flat   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.270 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.168 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 13 - Commercial: A9 Other   Total area (ac): 0.125
31 - Sidewalks 1: 0.088 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.023 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.014 ac.   Source Area PSD File:

LU# 14 - Commercial: A5 Other   Total area (ac): 0.003
45 - Large Landscaped Areas 1: 0.003 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 15 - Commercial: A8 Other   Total area (ac): 0.154
1 - Roofs 1: 0.006 ac.   Flat   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.139 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.009 ac.   Source Area PSD File:

Control Practice 1: Isolator Row CP# 1 (DS) - DS Isolator Row # 1
Total available system length (ft) = 232
Total available system width (ft) = 33
Available height from chamber base to surface (ft) = 4.00
Number of isolator rows = 2
Native soil infiltration rate (in/hr) = 0.00

```
   Assumed stone porosity () = 0.40
   Sizing option:  Number of rows and row length
      Number of rows = 8
      Row length ftf) = 200
   Selected Chamber Information
      Chamber type:  SC-310
      Chamber height (in):  16.00
      Chamber width (in):  40.00
      Chamber segment length (in):  85.40
      Final storage volume (cf):  7438.667
      Number of rows:  8
      Row length (ft):  200.0
      Total system length (ft):  1600.0
      Total system width (ft):  26.7
      Number of chambers:  224
   Overflow weir invert elevation (ft) = 3.75
   Orifice 1 invert elevation (ft) = 0.08
   Orifice 1 diameter (ft) = 1.00
   Orifice 2 invert elevation (ft) = 0.00
   Orifice 2 diameter (ft) = 0.00


Control Practice 2:  Biofilter CP# 1 (DS) - DS Biofilters # 1
   1.  Top area (square feet) =  1422
   2.  Bottom aea (square feet) =  611
   3.  Depth (ft):   3.5
   4.  Biofilter width (ft) - for Cost Purposes Only:   10
   5.  Infiltration rate (in/hr) =  0
   6.  Random infiltration rate generation?  No
   7.  Infiltration rate fraction (side):   0.001
   8.  Infiltration rate fraction (bottom):   0.001
   9.  Depth of biofilter that is rock filled (ft) 0
   10.  Porosity of rock filled volume =  0
   11.  Engineered soil infiltration rate:   3.6
   12.  Engineered soil depth (ft) =  2
   13.  Engineered soil porosity =  0.27
   14. Percent solids reduction due to flow through engineered soil =  80
   15. Biofilter peak to average flow ratio =  3.8
```

```
   16. Number of biofiltration control devices =  1
   17. Particle size distribution file:  Not needed - calculated by program
   18. Initial water surface elevation (ft):   0
   Soil Data                        Soil Type Fraction in Eng. Soil
       User-Defined Soil Type         1.000
   Biofilter Outlet/Discharge Characteristics:
       Outlet type:  Broad Crested Weir
               1.  Weir crest length (ft):   10
               2.  Weir crest width (ft):   3
               3.  Height of datum to bottom of weir opening:   3.2
       Outlet type:  Vertical Stand Pipe
               1.  Stand pipe diameter (ft):   2
               2.  Stand pipe height above datum (ft):   2.8
       Outlet type:  Drain Tile/Underdrain
               1.  Underdrain outlet diameter (ft):   0.5
               2.  Invert elevation above datum (ft):   0
               3.  Number of underdrain outlets:   1


Control Practice 3:  Other Device CP# 1 (DS) - DS Other Device # 1
   Fraction of drainage area served by device (ac) = 1.00
   Particulate Concentration reduction fraction = 1.00
   Filterable Concentration reduction fraction = 1.00
   Runoff volume reduction fraction = 0


Control Practice 4:  Other Device CP# 2 (DS) - DS Other Device # 2
   Fraction of drainage area served by device (ac) = 1.00
   Particulate Concentration reduction fraction = 1.00
   Filterable Concentration reduction fraction = 1.00
   Runoff volume reduction fraction = 0


Control Practice 5:  Other Device CP# 3 (DS) - DS Other Device # 3
   Fraction of drainage area served by device (ac) = 1.00
   Particulate Concentration reduction fraction = 1.00
   Filterable Concentration reduction fraction = 1.00
   Runoff volume reduction fraction = 0
```

```
Control Practice 6:  Biofilter CP# 2 (DS) - DS Biofilters # 2
   1.  Top area (square feet) =  757
   2.  Bottom aea (square feet) =  410
   3.  Depth (ft):   4
   4.  Biofilter width (ft) - for Cost Purposes Only:   10
   5.  Infiltration rate (in/hr) =  0
   6.  Random infiltration rate generation?  No
   7.  Infiltration rate fraction (side):   0.01
   8.  Infiltration rate fraction (bottom):   1
   9.  Depth of biofilter that is rock filled (ft) 0
   10.  Porosity of rock filled volume =  0
   11.  Engineered soil infiltration rate:   3.6
   12.  Engineered soil depth (ft) =  2
   13.  Engineered soil porosity =  0.27
   14. Percent solids reduction due to flow through engineered soil =  80
   15. Biofilter peak to average flow ratio =  3.8
   16. Number of biofiltration control devices =  1
   17. Particle size distribution file:  Not needed - calculated by program
   18. Initial water surface elevation (ft):   0
   Soil Data                        Soil Type Fraction in Eng. Soil
       User-Defined Soil Type         1.000
   Biofilter Outlet/Discharge Characteristics:
       Outlet type:  Broad Crested Weir
              1.  Weir crest length (ft):   8
              2.  Weir crest width (ft):   2
              3.  Height of datum to bottom of weir opening:   3
       Outlet type:  Vertical Stand Pipe
              1.  Stand pipe diameter (ft):   4
              2.  Stand pipe height above datum (ft):   2.45
       Outlet type:  Drain Tile/Underdrain
              1.  Underdrain outlet diameter (ft):   0.5
              2.  Invert elevation above datum (ft):   0
              3.  Number of underdrain outlets:   1


Control Practice 7:  Other Device CP# 4 (DS) - DS Other Device # 4
```

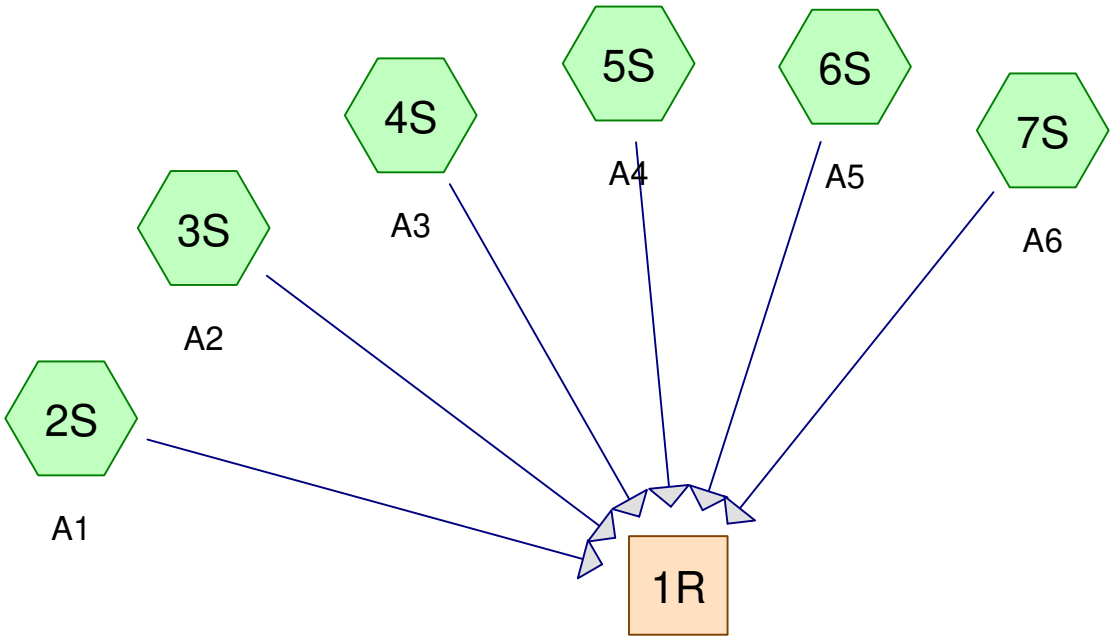
Fraction of drainage area served by device (ac) = 1.00
Particulate Concentration reduction fraction = 1.00
Filterable Concentration reduction fraction = 1.00
Runoff volume reduction fraction = 0

SLAMM for Windows Version 10.4.1

Data file name: M:\MSR (Meyer, Scherer & Rockcastle Ltd)\180275_Madison Market\Design Development\Modeling\TSS Control\MPM TSS Controls - Parking Area Only.mdb
Data file description:
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Start of Winter Season: 12/02 End of Winter Season: 03/12
Model Run Start Date: 01/01/81 Model Run End Date: 12/31/81
Date of run: 05-31-2021 Time of run: 14:52:15
Total Area Modeled (acres): 4.073
Years in Model Run: 1.00

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	230041	-	63.66	914.2	-
Outfall Total with Controls:	230550	-0.22%	25.85	372.1	59.30%
Annualized Total After Outfall Controls:	231184			373.1	

5.1 Pre-Developed Peak Runoff Rate Control Calculations



Existing Conditions

Subcat Reach Pond Link

Routing Diagram for MPM Predeveloped
Prepared by HP Inc., Printed 5/1/2020
HydroCAD® 10.00-14 s/n 03023 © 2015 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.201	74	>75% Grass cover, Good, HSG C (2S, 3S, 4S, 5S, 6S, 7S)
0.143	98	Gravel (2S)
2.399	98	Pavement (2S, 3S, 4S, 5S, 6S, 7S)
0.313	98	Roof (3S, 6S)
0.019	98	Sidewalk (4S, 7S)
4.075	**91**	**TOTAL AREA**

Summary for Subcatchment 2S: A1

Runoff = 1.65 cfs @ 12.14 hrs, Volume= 0.088 af, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
	26,822	74	>75% Grass cover, Good, HSG C
*	6,213	98	Gravel
*	10,655	98	Pavement
	43,690	83	Weighted Average
	26,822		61.39% Pervious Area
	16,868		38.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: A2

Runoff = 0.93 cfs @ 12.13 hrs, Volume= 0.052 af, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
*	11,333	98	Roof
	2,683	74	>75% Grass cover, Good, HSG C
*	713	98	Pavement
	14,729	94	Weighted Average
	2,683		18.22% Pervious Area
	12,046		81.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: A3

Runoff = 0.38 cfs @ 12.13 hrs, Volume= 0.021 af, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
*	4,689	98	Pavement
*	174	98	Sidewalk
	1,652	74	>75% Grass cover, Good, HSG C
	6,515	92	Weighted Average
	1,652		25.36% Pervious Area
	4,863		74.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: A4

Runoff = 0.14 cfs @ 12.13 hrs, Volume= 0.008 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
*	1,883	98	Pavement
	212	74	>75% Grass cover, Good, HSG C
	2,095	96	Weighted Average
	212		10.12% Pervious Area
	1,883		89.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 6S: A5

Runoff = 6.18 cfs @ 12.13 hrs, Volume= 0.358 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
	9,226	74	>75% Grass cover, Good, HSG C
*	79,800	98	Pavement
*	2,311	98	Roof
	91,337	96	Weighted Average
	9,226		10.10% Pervious Area
	82,111		89.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 7S: A6

Runoff = 0.72 cfs @ 12.14 hrs, Volume= 0.038 af, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
*	6,752	98	Pavement
*	652	98	Sidewalk
	11,716	74	>75% Grass cover, Good, HSG C
	19,120	83	Weighted Average
	11,716		61.28% Pervious Area
	7,404		38.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 1R: Existing Conditions

Inflow Area = 4.075 ac, 70.53% Impervious, Inflow Depth = 1.67" for 1-Year event
Inflow = 10.00 cfs @ 12.13 hrs, Volume= 0.566 af
Outflow = 10.00 cfs @ 12.13 hrs, Volume= 0.566 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 2S: A1

Runoff = 2.08 cfs @ 12.13 hrs, Volume= 0.110 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
	26,822	74	>75% Grass cover, Good, HSG C
*	6,213	98	Gravel
*	10,655	98	Pavement
	43,690	83	Weighted Average
	26,822		61.39% Pervious Area
	16,868		38.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: A2

Runoff = 1.09 cfs @ 12.13 hrs, Volume= 0.062 af, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
*	11,333	98	Roof
	2,683	74	>75% Grass cover, Good, HSG C
*	713	98	Pavement
	14,729	94	Weighted Average
	2,683		18.22% Pervious Area
	12,046		81.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: A3

Runoff = 0.45 cfs @ 12.13 hrs, Volume= 0.025 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
*	4,689	98	Pavement
*	174	98	Sidewalk
	1,652	74	>75% Grass cover, Good, HSG C
	6,515	92	Weighted Average
	1,652		25.36% Pervious Area
	4,863		74.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: A4

Runoff = 0.16 cfs @ 12.13 hrs, Volume= 0.010 af, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
*	1,883	98	Pavement
	212	74	>75% Grass cover, Good, HSG C
	2,095	96	Weighted Average
	212		10.12% Pervious Area
	1,883		89.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 6S: A5

Runoff = 7.14 cfs @ 12.13 hrs, Volume= 0.418 af, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
	9,226	74	>75% Grass cover, Good, HSG C
*	79,800	98	Pavement
*	2,311	98	Roof
	91,337	96	Weighted Average
	9,226		10.10% Pervious Area
	82,111		89.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 7S: A6

Runoff = 0.91 cfs @ 12.13 hrs, Volume= 0.048 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
*	6,752	98	Pavement
*	652	98	Sidewalk
	11,716	74	>75% Grass cover, Good, HSG C
	19,120	83	Weighted Average
	11,716		61.28% Pervious Area
	7,404		38.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 1R: Existing Conditions

Inflow Area = 4.075 ac, 70.53% Impervious, Inflow Depth = 1.98" for 2-Year event
Inflow = 11.83 cfs @ 12.13 hrs, Volume= 0.673 af
Outflow = 11.83 cfs @ 12.13 hrs, Volume= 0.673 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 2S: A1

Runoff = 2.90 cfs @ 12.13 hrs, Volume= 0.155 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
	26,822	74	>75% Grass cover, Good, HSG C
*	6,213	98	Gravel
*	10,655	98	Pavement
	43,690	83	Weighted Average
	26,822		61.39% Pervious Area
	16,868		38.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: A2

Runoff = 1.38 cfs @ 12.13 hrs, Volume= 0.080 af, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
*	11,333	98	Roof
	2,683	74	>75% Grass cover, Good, HSG C
*	713	98	Pavement
	14,729	94	Weighted Average
	2,683		18.22% Pervious Area
	12,046		81.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: A3

Runoff = 0.58 cfs @ 12.13 hrs, Volume= 0.033 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
*	4,689	98	Pavement
*	174	98	Sidewalk
	1,652	74	>75% Grass cover, Good, HSG C
	6,515	92	Weighted Average
	1,652		25.36% Pervious Area
	4,863		74.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: A4

Runoff = 0.20 cfs @ 12.13 hrs, Volume= 0.012 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
*	1,883	98	Pavement
	212	74	>75% Grass cover, Good, HSG C
	2,095	96	Weighted Average
	212		10.12% Pervious Area
	1,883		89.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 6S: A5

Runoff = 8.92 cfs @ 12.13 hrs, Volume= 0.530 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
	9,226	74	>75% Grass cover, Good, HSG C
*	79,800	98	Pavement
*	2,311	98	Roof
	91,337	96	Weighted Average
	9,226		10.10% Pervious Area
	82,111		89.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 7S: A6

Runoff = 1.27 cfs @ 12.13 hrs, Volume= 0.068 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
*	6,752	98	Pavement
*	652	98	Sidewalk
	11,716	74	>75% Grass cover, Good, HSG C
	19,120	83	Weighted Average
	11,716		61.28% Pervious Area
	7,404		38.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 1R: Existing Conditions

Inflow Area = 4.075 ac, 70.53% Impervious, Inflow Depth = 2.58" for 5-Year event
Inflow = 15.25 cfs @ 12.13 hrs, Volume= 0.877 af
Outflow = 15.25 cfs @ 12.13 hrs, Volume= 0.877 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 2S: A1

Runoff = 3.68 cfs @ 12.13 hrs, Volume= 0.198 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
	26,822	74	>75% Grass cover, Good, HSG C
*	6,213	98	Gravel
*	10,655	98	Pavement
	43,690	83	Weighted Average
	26,822		61.39% Pervious Area
	16,868		38.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: A2

Runoff = 1.65 cfs @ 12.13 hrs, Volume= 0.096 af, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	11,333	98	Roof
	2,683	74	>75% Grass cover, Good, HSG C
*	713	98	Pavement
	14,729	94	Weighted Average
	2,683		18.22% Pervious Area
	12,046		81.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: A3

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 0.040 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	4,689	98	Pavement
*	174	98	Sidewalk
	1,652	74	>75% Grass cover, Good, HSG C
	6,515	92	Weighted Average
	1,652		25.36% Pervious Area
	4,863		74.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: A4

Runoff = 0.24 cfs @ 12.13 hrs, Volume= 0.015 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	1,883	98	Pavement
	212	74	>75% Grass cover, Good, HSG C
	2,095	96	Weighted Average
	212		10.12% Pervious Area
	1,883		89.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 6S: A5

Runoff = 10.55 cfs @ 12.13 hrs, Volume= 0.634 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
	9,226	74	>75% Grass cover, Good, HSG C
*	79,800	98	Pavement
*	2,311	98	Roof
	91,337	96	Weighted Average
	9,226		10.10% Pervious Area
	82,111		89.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 7S: A6

Runoff = 1.61 cfs @ 12.13 hrs, Volume= 0.086 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	6,752	98	Pavement
*	652	98	Sidewalk
	11,716	74	>75% Grass cover, Good, HSG C
	19,120	83	Weighted Average
	11,716		61.28% Pervious Area
	7,404		38.72% Impervious Area

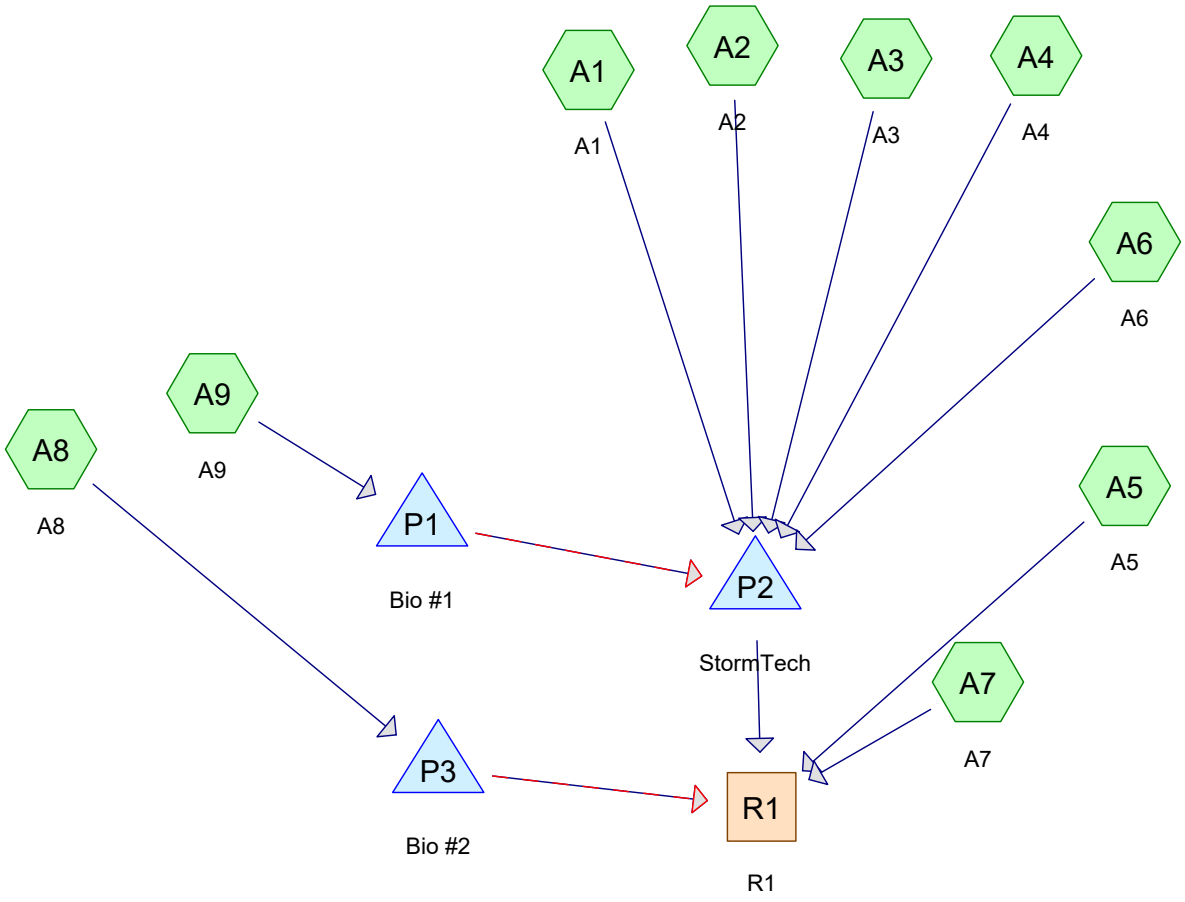
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 1R: Existing Conditions

Inflow Area = 4.075 ac, 70.53% Impervious, Inflow Depth = 3.15" for 10-Year event
Inflow = 18.43 cfs @ 12.13 hrs, Volume= 1.069 af
Outflow = 18.43 cfs @ 12.13 hrs, Volume= 1.069 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

5.2 Post-Developed Peak Runoff Rate Control Calculations



Subcat Reach Pond Link

Routing Diagram for MPM HydroCAD w Dry Storage
Prepared by HP Inc., Printed 5/31/2021

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.716	74	>75% Grass cover, Good, HSG C (A1, A2, A3)
0.442	80	>75% Grass cover, Good, HSG D (A4, A5, A6, A7, A8, A9)
0.143	98	Gravel (A1)
1.353	98	Parking (A6, A9)
0.485	98	Pavement (A1, A2, A3, A4, A5, A8)
0.277	98	Roof (A2, A6, A8)
0.277	98	Sidewalk (A3, A4, A6)
0.353	98	Sidewalks (A7, A9)
0.023	100	Stormwater (A8, A9)
4.067	**92**	**TOTAL AREA**

Summary for Subcatchment A1: A1

Runoff = 1.71 cfs @ 12.14 hrs, Volume= 0.088 af, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
	26,822	74	>75% Grass cover, Good, HSG C
*	6,213	98	Gravel
*	10,672	98	Pavement
	43,707	83	Weighted Average
	26,822		61.37% Pervious Area
	16,885		38.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A2: A2

Runoff = 0.97 cfs @ 12.13 hrs, Volume= 0.052 af, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (ac)	CN	Description
*	0.260	98	Roof
	0.062	74	>75% Grass cover, Good, HSG C
*	0.016	98	Pavement
	0.338	94	Weighted Average
	0.062		18.34% Pervious Area
	0.276		81.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A3: A3

Runoff = 0.40 cfs @ 12.13 hrs, Volume= 0.021 af, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
*	4,689	98	Pavement
*	174	98	Sidewalk
	1,653	74	>75% Grass cover, Good, HSG C
	6,516	92	Weighted Average
	1,653		25.37% Pervious Area
	4,863		74.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A4: A4

Runoff = 0.13 cfs @ 12.13 hrs, Volume= 0.007 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
*	1,391	98	Pavement
	567	80	>75% Grass cover, Good, HSG D
*	125	98	Sidewalk
	2,083	93	Weighted Average
	567		27.22% Pervious Area
	1,516		72.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A5: A5

Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.001 af, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
	144	80	>75% Grass cover, Good, HSG D
*	320	98	Pavement
	464	92	Weighted Average
	144		31.03% Pervious Area
	320		68.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A6: A6

Runoff = 5.01 cfs @ 12.13 hrs, Volume= 0.280 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
*	51,892	98	Parking
*	11,757	98	Sidewalk
	7,321	80	>75% Grass cover, Good, HSG D
*	479	98	Roof
	71,449	96	Weighted Average
	7,321		10.25% Pervious Area
	64,128		89.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A7: A7

Runoff = 1.01 cfs @ 12.13 hrs, Volume= 0.054 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
*	11,525	98	Sidewalks
	4,398	80	>75% Grass cover, Good, HSG D
	15,923	93	Weighted Average
	4,398		27.62% Pervious Area
	11,525		72.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A8: A8

Runoff = 0.49 cfs @ 12.13 hrs, Volume= 0.025 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
	5,671	80	>75% Grass cover, Good, HSG D
*	3,337	98	Pavement
*	261	98	Roof
*	410	100	Stormwater
	9,679	88	Weighted Average
	5,671		58.59% Pervious Area
	4,008		41.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A9: A9

Runoff = 0.89 cfs @ 12.13 hrs, Volume= 0.050 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 1-Year Rainfall=2.49"

	Area (sf)	CN	Description
*	611	100	Stormwater
*	7,033	98	Parking
*	3,830	98	Sidewalks
	1,151	80	>75% Grass cover, Good, HSG D
	12,625	96	Weighted Average
	1,151		9.12% Pervious Area
	11,474		90.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach R1: R1

Inflow Area = 4.067 ac, 71.54% Impervious, Inflow Depth = 1.61" for 1-Year event
Inflow = 5.30 cfs @ 12.20 hrs, Volume= 0.546 af
Outflow = 5.30 cfs @ 12.20 hrs, Volume= 0.546 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond P1: Bio #1

Inflow Area = 0.290 ac, 90.88% Impervious, Inflow Depth = 2.05" for 1-Year event
Inflow = 0.89 cfs @ 12.13 hrs, Volume= 0.050 af
Outflow = 0.50 cfs @ 12.21 hrs, Volume= 0.027 af, Atten= 44%, Lag= 4.7 min
Primary = 0.50 cfs @ 12.21 hrs, Volume= 0.027 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 851.18' @ 12.21 hrs Surf.Area= 1,089 sf Storage= 1,087 cf

Plug-Flow detention time= 184.7 min calculated for 0.027 af (54% of inflow)
Center-of-Mass det. time= 92.4 min (868.1 - 775.7)

Volume	Invert	Avail.Storage	Storage Description
#1	848.29'	6,081 cf	**Overall Storage (Prismatic)**Listed below (Recalc) 7,303 cf Overall - 1,222 cf Embedded = 6,081 cf
#2	848.30'	330 cf	**Engineered Soil (Prismatic)**Listed below (Recalc) Inside #1 1,222 cf Overall x 27.0% Voids
		6,411 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
848.29	611	0	0
850.30	611	1,228	1,228
851.80	1,422	1,525	2,753
855.00	1,422	4,550	7,303

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
848.30	611	0	0
850.30	611	1,222	1,222

Device	Routing	Invert	Outlet Devices
#1	Primary	848.30'	**6.0" Vert. 6" Underdrain Orifice** C= 0.600
#2	Device 1	851.10'	**24.0" Horiz. 24" Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	851.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.50 cfs @ 12.21 hrs HW=851.18' TW=848.47' (Dynamic Tailwater)
↑—**1=6" Underdrain Orifice** (Passes 0.50 cfs of 1.53 cfs potential flow)
↑—**2=24" Grate** (Weir Controls 0.50 cfs @ 0.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=848.29' TW=847.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P2: StormTech

Inflow Area = 3.469 ac, 73.39% Impervious, Inflow Depth = 1.64" for 1-Year event
Inflow = 8.22 cfs @ 12.13 hrs, Volume= 0.475 af
Outflow = 4.44 cfs @ 12.23 hrs, Volume= 0.475 af, Atten= 46%, Lag= 5.8 min
Primary = 4.44 cfs @ 12.23 hrs, Volume= 0.475 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 848.48' @ 12.23 hrs Surf.Area= 7,656 sf Storage= 6,299 cf

Plug-Flow detention time= 75.6 min calculated for 0.475 af (100% of inflow)
Center-of-Mass det. time= 75.3 min (868.5 - 793.2)

Volume	Invert	Avail.Storage	Storage Description
#1	847.00'	23,208 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 61,248 cf Overall - 3,228 cf Embedded = 58,020 cf x 40.0% Voids
#2	847.50'	3,228 cf	**ADS_StormTech SC-310** x 219 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		26,436 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.00	7,656	0	0
849.33	7,656	17,838	17,838
855.00	7,656	43,410	61,248

Device	Routing	Invert	Outlet Devices
#1	Primary	847.00'	**18.0" Round 18" Pipe** L= 195.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 847.00' / 846.30' S= 0.0036 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	847.58'	**12.0" Round 12" Stubs Culvert X 2.00** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 847.58' / 847.50' S= 0.0160 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Device 1	847.00'	**4.0" Vert. 4" Underdrain x 1** C= 0.600

Primary OutFlow Max=4.44 cfs @ 12.23 hrs HW=848.48' TW=0.00' (Dynamic Tailwater)
- **1=18" Pipe** (Passes 4.44 cfs of 5.60 cfs potential flow)
  - **2=12" Stubs Culvert** (Barrel Controls 3.96 cfs @ 3.53 fps)
  - **3=4" Underdrain x 1** (Orifice Controls 0.48 cfs @ 5.51 fps)

Summary for Pond P3: Bio #2

Inflow Area = 0.222 ac, 41.41% Impervious, Inflow Depth = 1.37" for 1-Year event
Inflow = 0.49 cfs @ 12.13 hrs, Volume= 0.025 af
Outflow = 0.31 cfs @ 12.20 hrs, Volume= 0.016 af, Atten= 37%, Lag= 4.1 min
Primary = 0.31 cfs @ 12.20 hrs, Volume= 0.016 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 849.79' @ 12.20 hrs Surf.Area= 495 sf Storage= 446 cf

Plug-Flow detention time= 159.0 min calculated for 0.016 af (61% of inflow)
Center-of-Mass det. time= 67.3 min (880.1 - 812.8)

Volume	Invert	Avail.Storage	Storage Description
#1	847.29'	1,171 cf	**Overall Storage (Prismatic)**Listed below (Recalc) 1,991 cf Overall - 820 cf Embedded = 1,171 cf
#2	847.30'	221 cf	**Engineered Soil (Prismatic)**Listed below (Recalc) Inside #1 820 cf Overall x 27.0% Voids
		1,392 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.29	410	0	0
849.30	410	824	824
851.30	757	1,167	1,991

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.30	410	0	0
849.30	410	820	820

Device	Routing	Invert	Outlet Devices
#1	Primary	847.30'	**6.0" Vert. 6" Underdrain Orifice** C= 0.600
#2	Device 1	849.75'	**48.0" Horiz. 48" Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	850.30'	**8.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.31 cfs @ 12.20 hrs HW=849.79' TW=0.00' (Dynamic Tailwater)
└─**1=6" Underdrain Orifice** (Passes 0.31 cfs of 1.41 cfs potential flow)
└─**2=48" Grate** (Weir Controls 0.31 cfs @ 0.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=847.29' TW=0.00' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment A1: A1

Runoff = 2.15 cfs @ 12.13 hrs, Volume= 0.110 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
	26,822	74	>75% Grass cover, Good, HSG C
*	6,213	98	Gravel
*	10,672	98	Pavement
	43,707	83	Weighted Average
	26,822		61.37% Pervious Area
	16,885		38.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A2: A2

Runoff = 1.13 cfs @ 12.13 hrs, Volume= 0.062 af, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (ac)	CN	Description
*	0.260	98	Roof
	0.062	74	>75% Grass cover, Good, HSG C
*	0.016	98	Pavement
	0.338	94	Weighted Average
	0.062		18.34% Pervious Area
	0.276		81.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A3: A3

Runoff = 0.47 cfs @ 12.13 hrs, Volume= 0.025 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
*	4,689	98	Pavement
*	174	98	Sidewalk
	1,653	74	>75% Grass cover, Good, HSG C
	6,516	92	Weighted Average
	1,653		25.37% Pervious Area
	4,863		74.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A4: A4

Runoff = 0.16 cfs @ 12.13 hrs, Volume= 0.008 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
*	1,391	98	Pavement
	567	80	>75% Grass cover, Good, HSG D
*	125	98	Sidewalk
	2,083	93	Weighted Average
	567		27.22% Pervious Area
	1,516		72.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A5: A5

Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.002 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
	144	80	>75% Grass cover, Good, HSG D
*	320	98	Pavement
	464	92	Weighted Average
	144		31.03% Pervious Area
	320		68.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A6: A6

Runoff = 5.79 cfs @ 12.13 hrs, Volume= 0.327 af, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
*	51,892	98	Parking
*	11,757	98	Sidewalk
	7,321	80	>75% Grass cover, Good, HSG D
*	479	98	Roof
	71,449	96	Weighted Average
	7,321		10.25% Pervious Area
	64,128		89.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A7: A7

Runoff = 1.19 cfs @ 12.13 hrs, Volume= 0.064 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
*	11,525	98	Sidewalks
	4,398	80	>75% Grass cover, Good, HSG D
	15,923	93	Weighted Average
	4,398		27.62% Pervious Area
	11,525		72.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A8: A8

Runoff = 0.60 cfs @ 12.13 hrs, Volume= 0.031 af, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
	5,671	80	>75% Grass cover, Good, HSG D
*	3,337	98	Pavement
*	261	98	Roof
*	410	100	Stormwater
	9,679	88	Weighted Average
	5,671		58.59% Pervious Area
	4,008		41.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A9: A9

Runoff = 1.02 cfs @ 12.13 hrs, Volume= 0.058 af, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 2-Year Rainfall=2.84"

	Area (sf)	CN	Description
*	611	100	Stormwater
*	7,033	98	Parking
*	3,830	98	Sidewalks
	1,151	80	>75% Grass cover, Good, HSG D
	12,625	96	Weighted Average
	1,151		9.12% Pervious Area
	11,474		90.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach R1: R1

Inflow Area = 4.067 ac, 71.54% Impervious, Inflow Depth = 1.93" for 2-Year event
Inflow = 7.13 cfs @ 12.19 hrs, Volume= 0.654 af
Outflow = 7.13 cfs @ 12.19 hrs, Volume= 0.654 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond P1: Bio #1

Inflow Area = 0.290 ac, 90.88% Impervious, Inflow Depth = 2.39" for 2-Year event
Inflow = 1.02 cfs @ 12.13 hrs, Volume= 0.058 af
Outflow = 0.86 cfs @ 12.17 hrs, Volume= 0.035 af, Atten= 16%, Lag= 2.3 min
Primary = 0.86 cfs @ 12.17 hrs, Volume= 0.035 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 851.22' @ 12.17 hrs Surf.Area= 1,109 sf Storage= 1,127 cf

Plug-Flow detention time= 165.0 min calculated for 0.035 af (60% of inflow)
Center-of-Mass det. time= 78.2 min (850.4 - 772.3)

Volume	Invert	Avail.Storage	Storage Description
#1	848.29'	6,081 cf	**Overall Storage (Prismatic)**Listed below (Recalc) 7,303 cf Overall - 1,222 cf Embedded = 6,081 cf
#2	848.30'	330 cf	**Engineered Soil (Prismatic)**Listed below (Recalc) Inside #1 1,222 cf Overall x 27.0% Voids
		6,411 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
848.29	611	0	0
850.30	611	1,228	1,228
851.80	1,422	1,525	2,753
855.00	1,422	4,550	7,303

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
848.30	611	0	0
850.30	611	1,222	1,222

Device	Routing	Invert	Outlet Devices
#1	Primary	848.30'	**6.0" Vert. 6" Underdrain Orifice** C= 0.600
#2	Device 1	851.10'	**24.0" Horiz. 24" Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	851.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.85 cfs @ 12.17 hrs HW=851.22' TW=848.63' (Dynamic Tailwater)
↑—**1=6" Underdrain Orifice** (Passes 0.85 cfs of 1.52 cfs potential flow)
↑—**2=24" Grate** (Weir Controls 0.85 cfs @ 1.13 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=848.29' TW=847.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P2: StormTech

Inflow Area = 3.469 ac, 73.39% Impervious, Inflow Depth = 1.96" for 2-Year event
Inflow = 10.37 cfs @ 12.14 hrs, Volume= 0.568 af
Outflow = 5.95 cfs @ 12.21 hrs, Volume= 0.567 af, Atten= 43%, Lag= 4.6 min
Primary = 5.95 cfs @ 12.21 hrs, Volume= 0.567 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 848.70' @ 12.21 hrs Surf.Area= 7,656 sf Storage= 7,136 cf

Plug-Flow detention time= 69.8 min calculated for 0.567 af (100% of inflow)
Center-of-Mass det. time= 69.6 min (859.0 - 789.4)

Volume	Invert	Avail.Storage	Storage Description
#1	847.00'	23,208 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 61,248 cf Overall - 3,228 cf Embedded = 58,020 cf x 40.0% Voids
#2	847.50'	3,228 cf	**ADS_StormTech SC-310** x 219 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		26,436 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.00	7,656	0	0
849.33	7,656	17,838	17,838
855.00	7,656	43,410	61,248

Device	Routing	Invert	Outlet Devices
#1	Primary	847.00'	**18.0" Round 18" Pipe** L= 195.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 847.00' / 846.30' S= 0.0036 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	847.58'	**12.0" Round 12" Stubs Culvert X 2.00** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 847.58' / 847.50' S= 0.0160 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Device 1	847.00'	**4.0" Vert. 4" Underdrain x 1** C= 0.600

Primary OutFlow Max=5.95 cfs @ 12.21 hrs HW=848.70' TW=0.00' (Dynamic Tailwater)
- **1=18" Pipe** (Passes 5.95 cfs of 6.61 cfs potential flow)
  - **2=12" Stubs Culvert** (Barrel Controls 5.43 cfs @ 3.84 fps)
  - **3=4" Underdrain x 1** (Orifice Controls 0.52 cfs @ 5.97 fps)

Summary for Pond P3: Bio #2

Inflow Area = 0.222 ac, 41.41% Impervious, Inflow Depth = 1.68" for 2-Year event
Inflow = 0.60 cfs @ 12.13 hrs, Volume= 0.031 af
Outflow = 0.58 cfs @ 12.15 hrs, Volume= 0.021 af, Atten= 4%, Lag= 1.2 min
Primary = 0.58 cfs @ 12.15 hrs, Volume= 0.021 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 849.81' @ 12.15 hrs Surf.Area= 498 sf Storage= 456 cf

Plug-Flow detention time= 136.4 min calculated for 0.021 af (68% of inflow)
Center-of-Mass det. time= 51.7 min (859.7 - 808.0)

Volume	Invert	Avail.Storage	Storage Description
#1	847.29'	1,171 cf	**Overall Storage (Prismatic)**Listed below (Recalc) 1,991 cf Overall - 820 cf Embedded = 1,171 cf
#2	847.30'	221 cf	**Engineered Soil (Prismatic)**Listed below (Recalc) Inside #1 820 cf Overall x 27.0% Voids
		1,392 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.29	410	0	0
849.30	410	824	824
851.30	757	1,167	1,991

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.30	410	0	0
849.30	410	820	820

Device	Routing	Invert	Outlet Devices
#1	Primary	847.30'	**6.0" Vert. 6" Underdrain Orifice** C= 0.600
#2	Device 1	849.75'	**48.0" Horiz. 48" Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	850.30'	**8.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.57 cfs @ 12.15 hrs HW=849.81' TW=0.00' (Dynamic Tailwater)
↑—**1=6" Underdrain Orifice** (Passes 0.57 cfs of 1.42 cfs potential flow)
↑—**2=48" Grate** (Weir Controls 0.57 cfs @ 0.79 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=847.29' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment A1: A1

Runoff = 3.01 cfs @ 12.13 hrs, Volume= 0.155 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
	26,822	74	>75% Grass cover, Good, HSG C
*	6,213	98	Gravel
*	10,672	98	Pavement
	43,707	83	Weighted Average
	26,822		61.37% Pervious Area
	16,885		38.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A2: A2

Runoff = 1.43 cfs @ 12.13 hrs, Volume= 0.080 af, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (ac)	CN	Description
*	0.260	98	Roof
	0.062	74	>75% Grass cover, Good, HSG C
*	0.016	98	Pavement
	0.338	94	Weighted Average
	0.062		18.34% Pervious Area
	0.276		81.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A3: A3

Runoff = 0.60 cfs @ 12.13 hrs, Volume= 0.033 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
*	4,689	98	Pavement
*	174	98	Sidewalk
	1,653	74	>75% Grass cover, Good, HSG C
	6,516	92	Weighted Average
	1,653		25.37% Pervious Area
	4,863		74.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A4: A4

Runoff = 0.20 cfs @ 12.13 hrs, Volume= 0.011 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
*	1,391	98	Pavement
	567	80	>75% Grass cover, Good, HSG D
*	125	98	Sidewalk
	2,083	93	Weighted Average
	567		27.22% Pervious Area
	1,516		72.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A5: A5

Runoff = 0.04 cfs @ 12.13 hrs, Volume= 0.002 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
	144	80	>75% Grass cover, Good, HSG D
*	320	98	Pavement
	464	92	Weighted Average
	144		31.03% Pervious Area
	320		68.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A6: A6

Runoff = 7.23 cfs @ 12.13 hrs, Volume= 0.415 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
*	51,892	98	Parking
*	11,757	98	Sidewalk
	7,321	80	>75% Grass cover, Good, HSG D
*	479	98	Roof
	71,449	96	Weighted Average
	7,321		10.25% Pervious Area
	64,128		89.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A7: A7

Runoff = 1.51 cfs @ 12.13 hrs, Volume= 0.083 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
*	11,525	98	Sidewalks
	4,398	80	>75% Grass cover, Good, HSG D
	15,923	93	Weighted Average
	4,398		27.62% Pervious Area
	11,525		72.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A8: A8

Runoff = 0.80 cfs @ 12.13 hrs, Volume= 0.042 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
	5,671	80	>75% Grass cover, Good, HSG D
*	3,337	98	Pavement
*	261	98	Roof
*	410	100	Stormwater
	9,679	88	Weighted Average
	5,671		58.59% Pervious Area
	4,008		41.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A9: A9

Runoff = 1.28 cfs @ 12.13 hrs, Volume= 0.073 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 5-Year Rainfall=3.49"

	Area (sf)	CN	Description
*	611	100	Stormwater
*	7,033	98	Parking
*	3,830	98	Sidewalks
	1,151	80	>75% Grass cover, Good, HSG D
	12,625	96	Weighted Average
	1,151		9.12% Pervious Area
	11,474		90.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach R1: R1

Inflow Area = 4.067 ac, 71.54% Impervious, Inflow Depth = 2.54" for 5-Year event
Inflow = 9.39 cfs @ 12.14 hrs, Volume= 0.860 af
Outflow = 9.39 cfs @ 12.14 hrs, Volume= 0.860 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond P1: Bio #1

Inflow Area = 0.290 ac, 90.88% Impervious, Inflow Depth = 3.04" for 5-Year event
Inflow = 1.28 cfs @ 12.13 hrs, Volume= 0.073 af
Outflow = 1.21 cfs @ 12.15 hrs, Volume= 0.050 af, Atten= 5%, Lag= 1.3 min
Primary = 1.21 cfs @ 12.15 hrs, Volume= 0.050 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 851.25' @ 12.15 hrs Surf.Area= 1,125 sf Storage= 1,162 cf

Plug-Flow detention time= 144.5 min calculated for 0.050 af (69% of inflow)
Center-of-Mass det. time= 65.0 min (832.2 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1	848.29'	6,081 cf	**Overall Storage (Prismatic)**Listed below (Recalc) 7,303 cf Overall - 1,222 cf Embedded = 6,081 cf
#2	848.30'	330 cf	**Engineered Soil (Prismatic)**Listed below (Recalc) Inside #1 1,222 cf Overall x 27.0% Voids
		6,411 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
848.29	611	0	0
850.30	611	1,228	1,228
851.80	1,422	1,525	2,753
855.00	1,422	4,550	7,303

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
848.30	611	0	0
850.30	611	1,222	1,222

Device	Routing	Invert	Outlet Devices
#1	Primary	848.30'	**6.0" Vert. 6" Underdrain Orifice** C= 0.600
#2	Device 1	851.10'	**24.0" Horiz. 24" Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	851.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.21 cfs @ 12.15 hrs HW=851.25' TW=849.00' (Dynamic Tailwater)
↑└**1=6" Underdrain Orifice** (Passes 1.21 cfs of 1.42 cfs potential flow)
↑└**2=24" Grate** (Weir Controls 1.21 cfs @ 1.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=848.29' TW=847.00' (Dynamic Tailwater)
↑└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P2: StormTech

Inflow Area = 3.469 ac, 73.39% Impervious, Inflow Depth = 2.57" for 5-Year event
Inflow = 13.64 cfs @ 12.13 hrs, Volume= 0.743 af
Outflow = 7.51 cfs @ 12.21 hrs, Volume= 0.743 af, Atten= 45%, Lag= 4.9 min
Primary = 7.51 cfs @ 12.21 hrs, Volume= 0.743 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 849.22' @ 12.21 hrs Surf.Area= 7,656 sf Storage= 8,737 cf

Plug-Flow detention time= 62.6 min calculated for 0.743 af (100% of inflow)
Center-of-Mass det. time= 62.5 min (846.4 - 783.9)

Volume	Invert	Avail.Storage	Storage Description
#1	847.00'	23,208 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 61,248 cf Overall - 3,228 cf Embedded = 58,020 cf x 40.0% Voids
#2	847.50'	3,228 cf	**ADS_StormTech SC-310** x 219 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		26,436 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.00	7,656	0	0
849.33	7,656	17,838	17,838
855.00	7,656	43,410	61,248

Device	Routing	Invert	Outlet Devices
#1	Primary	847.00'	**18.0" Round 18" Pipe** L= 195.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 847.00' / 846.30' S= 0.0036 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	847.58'	**12.0" Round 12" Stubs Culvert X 2.00** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 847.58' / 847.50' S= 0.0160 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Device 1	847.00'	**4.0" Vert. 4" Underdrain x 1** C= 0.600

Primary OutFlow Max=7.51 cfs @ 12.21 hrs HW=849.22' TW=0.00' (Dynamic Tailwater)
└**1=18" Pipe** (Barrel Controls 7.51 cfs @ 4.25 fps)
  └**2=12" Stubs Culvert** (Passes < 8.07 cfs potential flow)
  └**3=4" Underdrain x 1** (Passes < 0.60 cfs potential flow)

Summary for Pond P3: Bio #2

Inflow Area = 0.222 ac, 41.41% Impervious, Inflow Depth = 2.26" for 5-Year event
Inflow = 0.80 cfs @ 12.13 hrs, Volume= 0.042 af
Outflow = 0.79 cfs @ 12.14 hrs, Volume= 0.032 af, Atten= 1%, Lag= 0.5 min
Primary = 0.79 cfs @ 12.14 hrs, Volume= 0.032 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 849.82' @ 12.14 hrs Surf.Area= 501 sf Storage= 463 cf

Plug-Flow detention time= 112.3 min calculated for 0.032 af (77% of inflow)
Center-of-Mass det. time= 38.2 min (839.2 - 801.0)

Volume	Invert	Avail.Storage	Storage Description
#1	847.29'	1,171 cf	**Overall Storage (Prismatic)**Listed below (Recalc) 1,991 cf Overall - 820 cf Embedded = 1,171 cf
#2	847.30'	221 cf	**Engineered Soil (Prismatic)**Listed below (Recalc) Inside #1 820 cf Overall x 27.0% Voids
		1,392 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.29	410	0	0
849.30	410	824	824
851.30	757	1,167	1,991

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.30	410	0	0
849.30	410	820	820

Device	Routing	Invert	Outlet Devices
#1	Primary	847.30'	**6.0" Vert. 6" Underdrain Orifice** C= 0.600
#2	Device 1	849.75'	**48.0" Horiz. 48" Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	850.30'	**8.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.79 cfs @ 12.14 hrs HW=849.82' TW=0.00' (Dynamic Tailwater)
└─**1=6" Underdrain Orifice** (Passes 0.79 cfs of 1.42 cfs potential flow)
└─**2=48" Grate** (Weir Controls 0.79 cfs @ 0.88 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=847.29' TW=0.00' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment A1: A1

Runoff = 3.82 cfs @ 12.13 hrs, Volume= 0.198 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
	26,822	74	>75% Grass cover, Good, HSG C
*	6,213	98	Gravel
*	10,672	98	Pavement
	43,707	83	Weighted Average
	26,822		61.37% Pervious Area
	16,885		38.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A2: A2

Runoff = 1.71 cfs @ 12.13 hrs, Volume= 0.096 af, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (ac)	CN	Description
*	0.260	98	Roof
	0.062	74	>75% Grass cover, Good, HSG C
*	0.016	98	Pavement
	0.338	94	Weighted Average
	0.062		18.34% Pervious Area
	0.276		81.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A3: A3

Runoff = 0.73 cfs @ 12.13 hrs, Volume= 0.040 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	4,689	98	Pavement
*	174	98	Sidewalk
	1,653	74	>75% Grass cover, Good, HSG C
	6,516	92	Weighted Average
	1,653		25.37% Pervious Area
	4,863		74.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A4: A4

Runoff = 0.24 cfs @ 12.13 hrs, Volume= 0.013 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	1,391	98	Pavement
	567	80	>75% Grass cover, Good, HSG D
*	125	98	Sidewalk
	2,083	93	Weighted Average
	567		27.22% Pervious Area
	1,516		72.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A5: A5

Runoff = 0.05 cfs @ 12.13 hrs, Volume= 0.003 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
	144	80	>75% Grass cover, Good, HSG D
*	320	98	Pavement
	464	92	Weighted Average
	144		31.03% Pervious Area
	320		68.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A6: A6

Runoff = 8.56 cfs @ 12.13 hrs, Volume= 0.496 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	51,892	98	Parking
*	11,757	98	Sidewalk
	7,321	80	>75% Grass cover, Good, HSG D
*	479	98	Roof
	71,449	96	Weighted Average
	7,321		10.25% Pervious Area
	64,128		89.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A7: A7

Runoff = 1.82 cfs @ 12.13 hrs, Volume= 0.101 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	11,525	98	Sidewalks
	4,398	80	>75% Grass cover, Good, HSG D
	15,923	93	Weighted Average
	4,398		27.62% Pervious Area
	11,525		72.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A8: A8

Runoff = 0.98 cfs @ 12.13 hrs, Volume= 0.052 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
	5,671	80	>75% Grass cover, Good, HSG D
*	3,337	98	Pavement
*	261	98	Roof
*	410	100	Stormwater
	9,679	88	Weighted Average
	5,671		58.59% Pervious Area
	4,008		41.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A9: A9

Runoff = 1.51 cfs @ 12.13 hrs, Volume= 0.088 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	611	100	Stormwater
*	7,033	98	Parking
*	3,830	98	Sidewalks
	1,151	80	>75% Grass cover, Good, HSG D
	12,625	96	Weighted Average
	1,151		9.12% Pervious Area
	11,474		90.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach R1: R1

Inflow Area = 4.067 ac, 71.54% Impervious, Inflow Depth = 3.11" for 10-Year event
Inflow = 10.84 cfs @ 12.16 hrs, Volume= 1.053 af
Outflow = 10.84 cfs @ 12.16 hrs, Volume= 1.053 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond P1: Bio #1

Inflow Area = 0.290 ac, 90.88% Impervious, Inflow Depth = 3.63" for 10-Year event
Inflow = 1.51 cfs @ 12.13 hrs, Volume= 0.088 af
Outflow = 1.38 cfs @ 12.13 hrs, Volume= 0.065 af, Atten= 9%, Lag= 0.1 min
Primary = 1.38 cfs @ 12.13 hrs, Volume= 0.065 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 851.28' @ 12.17 hrs Surf.Area= 1,140 sf Storage= 1,193 cf

Plug-Flow detention time= 133.1 min calculated for 0.065 af (74% of inflow)
Center-of-Mass det. time= 58.8 min (822.4 - 763.5)

Volume	Invert	Avail.Storage	Storage Description
#1	848.29'	6,081 cf	**Overall Storage (Prismatic)**Listed below (Recalc) 7,303 cf Overall - 1,222 cf Embedded = 6,081 cf
#2	848.30'	330 cf	**Engineered Soil (Prismatic)**Listed below (Recalc) Inside #1 1,222 cf Overall x 27.0% Voids
		6,411 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
848.29	611	0	0
850.30	611	1,228	1,228
851.80	1,422	1,525	2,753
855.00	1,422	4,550	7,303

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
848.30	611	0	0
850.30	611	1,222	1,222

Device	Routing	Invert	Outlet Devices
#1	Primary	848.30'	**6.0" Vert. 6" Underdrain Orifice** C= 0.600
#2	Device 1	851.10'	**24.0" Horiz. 24" Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	851.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.35 cfs @ 12.13 hrs HW=851.27' TW=849.24' (Dynamic Tailwater)
↑—**1=6" Underdrain Orifice** (Orifice Controls 1.35 cfs @ 6.85 fps)
↑—**2=24" Grate** (Passes 1.35 cfs of 1.40 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=848.29' TW=847.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P2: StormTech

Inflow Area = 3.469 ac, 73.39% Impervious, Inflow Depth = 3.14" for 10-Year event
Inflow = 16.43 cfs @ 12.13 hrs, Volume= 0.908 af
Outflow = 8.72 cfs @ 12.22 hrs, Volume= 0.907 af, Atten= 47%, Lag= 5.4 min
Primary = 8.72 cfs @ 12.22 hrs, Volume= 0.907 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 849.72' @ 12.22 hrs Surf.Area= 7,656 sf Storage= 10,259 cf

Plug-Flow detention time= 58.6 min calculated for 0.907 af (100% of inflow)
Center-of-Mass det. time= 58.2 min (838.1 - 779.9)

Volume	Invert	Avail.Storage	Storage Description
#1	847.00'	23,208 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 61,248 cf Overall - 3,228 cf Embedded = 58,020 cf x 40.0% Voids
#2	847.50'	3,228 cf	**ADS_StormTech SC-310** x 219 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		26,436 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.00	7,656	0	0
849.33	7,656	17,838	17,838
855.00	7,656	43,410	61,248

Device	Routing	Invert	Outlet Devices
#1	Primary	847.00'	**18.0" Round 18" Pipe** L= 195.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 847.00' / 846.30' S= 0.0036 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	847.58'	**12.0" Round 12" Stubs Culvert X 2.00** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 847.58' / 847.50' S= 0.0160 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Device 1	847.00'	**4.0" Vert. 4" Underdrain x 1** C= 0.600

Primary OutFlow Max=8.72 cfs @ 12.22 hrs HW=849.72' TW=0.00' (Dynamic Tailwater)
- **1=18" Pipe** (Barrel Controls 8.72 cfs @ 4.94 fps)
  - **2=12" Stubs Culvert** (Passes < 9.68 cfs potential flow)
  - **3=4" Underdrain x 1** (Passes < 0.67 cfs potential flow)

Summary for Pond P3: Bio #2

Inflow Area = 0.222 ac, 41.41% Impervious, Inflow Depth = 2.81" for 10-Year event
Inflow = 0.98 cfs @ 12.13 hrs, Volume= 0.052 af
Outflow = 0.98 cfs @ 12.14 hrs, Volume= 0.042 af, Atten= 1%, Lag= 0.4 min
Primary = 0.98 cfs @ 12.14 hrs, Volume= 0.042 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 849.83' @ 12.14 hrs Surf.Area= 502 sf Storage= 468 cf

Plug-Flow detention time= 98.8 min calculated for 0.042 af (81% of inflow)
Center-of-Mass det. time= 32.5 min (828.3 - 795.8)

Volume	Invert	Avail.Storage	Storage Description
#1	847.29'	1,171 cf	**Overall Storage (Prismatic)**Listed below (Recalc) 1,991 cf Overall - 820 cf Embedded = 1,171 cf
#2	847.30'	221 cf	**Engineered Soil (Prismatic)**Listed below (Recalc) Inside #1 820 cf Overall x 27.0% Voids
		1,392 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.29	410	0	0
849.30	410	824	824
851.30	757	1,167	1,991

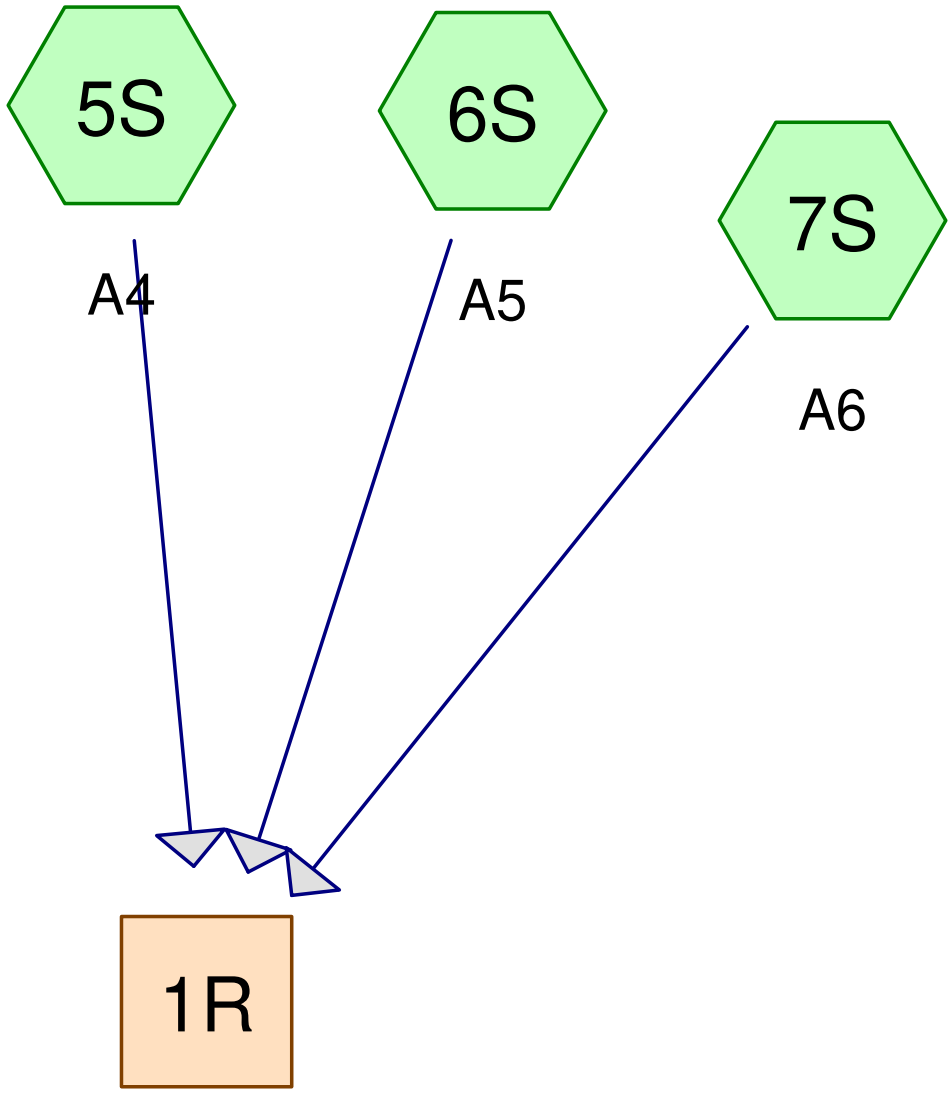
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
847.30	410	0	0
849.30	410	820	820

Device	Routing	Invert	Outlet Devices
#1	Primary	847.30'	**6.0" Vert. 6" Underdrain Orifice** C= 0.600
#2	Device 1	849.75'	**48.0" Horiz. 48" Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	850.30'	**8.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.97 cfs @ 12.14 hrs HW=849.83' TW=0.00' (Dynamic Tailwater)
└**1=6" Underdrain Orifice** (Passes 0.97 cfs of 1.43 cfs potential flow)
└**2=48" Grate** (Weir Controls 0.97 cfs @ 0.94 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=847.29' TW=0.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

6 Volume Reduction Calculations



Existing Conditions

Subcat Reach Pond Link

Routing Diagram for MPM Predeveloped
Prepared by HP Inc., Printed 5/1/2020
HydroCAD® 10.00-14 s/n 03023 © 2015 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.486	74	>75% Grass cover, Good, HSG C (5S, 6S, 7S)
2.030	98	Pavement (5S, 6S, 7S)
0.053	98	Roof (6S)
0.015	98	Sidewalk (7S)
2.584	**93**	**TOTAL AREA**

Summary for Subcatchment 5S: A4

Runoff = 0.24 cfs @ 12.13 hrs, Volume= 0.015 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	1,883	98	Pavement
	212	74	>75% Grass cover, Good, HSG C
	2,095	96	Weighted Average
	212		10.12% Pervious Area
	1,883		89.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 6S: A5

Runoff = 10.55 cfs @ 12.13 hrs, Volume= 0.634 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
	9,226	74	>75% Grass cover, Good, HSG C
*	79,800	98	Pavement
*	2,311	98	Roof
	91,337	96	Weighted Average
	9,226		10.10% Pervious Area
	82,111		89.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 7S: A6

Runoff = 1.61 cfs @ 12.13 hrs, Volume= 0.086 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

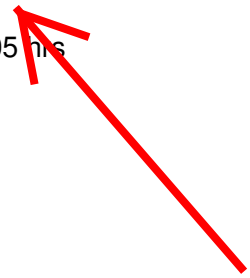
	Area (sf)	CN	Description
*	6,752	98	Pavement
*	652	98	Sidewalk
	11,716	74	>75% Grass cover, Good, HSG C
	19,120	83	Weighted Average
	11,716		61.28% Pervious Area
	7,404		38.72% Impervious Area

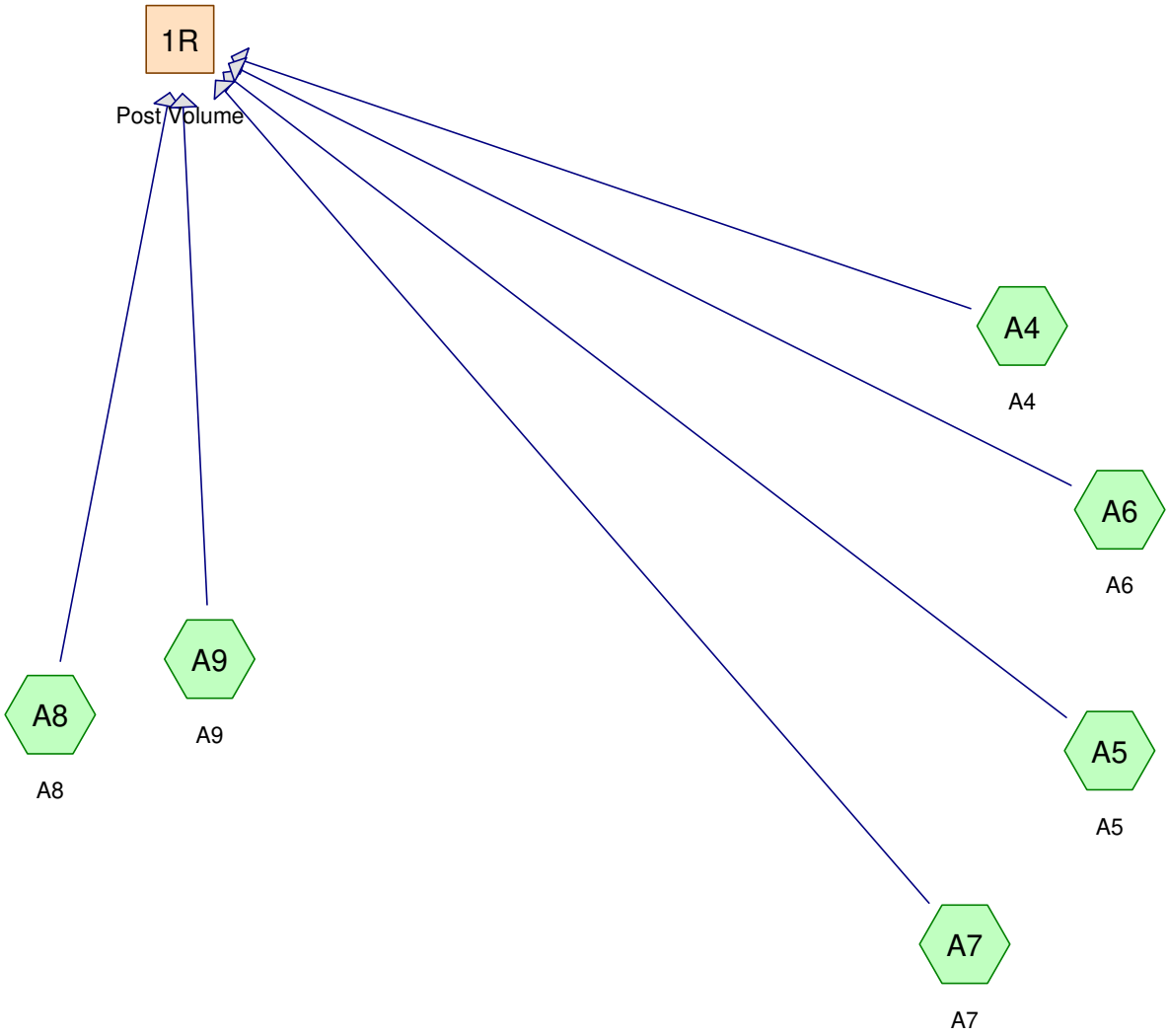
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 1R: Existing Conditions

Inflow Area = 2.584 ac, 81.21% Impervious, Inflow Depth = 3.41" for 10-Year event
Inflow = 12.40 cfs @ 12.13 hrs, Volume= 0.735 af
Outflow = 12.40 cfs @ 12.13 hrs, Volume= 0.735 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs





Subcat Reach Pond Link

Routing Diagram for MPM HydroCAD w Dry Storage
Prepared by HP Inc., Printed 5/1/2020
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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.442	80	>75% Grass cover, Good, HSG D (A4, A5, A6, A7, A8, A9)
1.353	98	Parking (A6, A9)
0.116	98	Pavement (A4, A5, A8)
0.017	98	Roof (A6, A8)
0.273	98	Sidewalk (A4, A6)
0.353	98	Sidewalks (A7, A9)
0.023	100	Stormwater (A8, A9)
2.576	**95**	**TOTAL AREA**

Summary for Subcatchment A4: A4

Runoff = 0.24 cfs @ 12.13 hrs, Volume= 0.013 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	1,391	98	Pavement
	567	80	>75% Grass cover, Good, HSG D
*	125	98	Sidewalk
	2,083	93	Weighted Average
	567		27.22% Pervious Area
	1,516		72.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A5: A5

Runoff = 0.05 cfs @ 12.13 hrs, Volume= 0.003 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
	144	80	>75% Grass cover, Good, HSG D
*	320	98	Pavement
	464	92	Weighted Average
	144		31.03% Pervious Area
	320		68.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A6: A6

Runoff = 8.56 cfs @ 12.13 hrs, Volume= 0.496 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	51,892	98	Parking
*	11,757	98	Sidewalk
	7,321	80	>75% Grass cover, Good, HSG D
*	479	98	Roof
	71,449	96	Weighted Average
	7,321		10.25% Pervious Area
	64,128		89.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A7: A7

Runoff = 1.82 cfs @ 12.13 hrs, Volume= 0.101 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
*	11,525	98	Sidewalks
	4,398	80	>75% Grass cover, Good, HSG D
	15,923	93	Weighted Average
	4,398		27.62% Pervious Area
	11,525		72.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A8: A8

Runoff = 0.98 cfs @ 12.13 hrs, Volume= 0.052 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

	Area (sf)	CN	Description
	5,671	80	>75% Grass cover, Good, HSG D
*	3,337	98	Pavement
*	261	98	Roof
*	410	100	Stormwater
	9,679	88	Weighted Average
	5,671		58.59% Pervious Area
	4,008		41.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment A9: A9

Runoff = 1.51 cfs @ 12.13 hrs, Volume= 0.088 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 10-Year Rainfall=4.09"

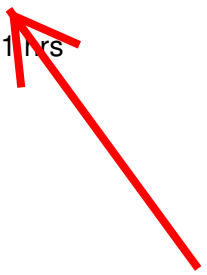
	Area (sf)	CN	Description
*	611	100	Stormwater
*	7,033	98	Parking
*	3,830	98	Sidewalks
	1,151	80	>75% Grass cover, Good, HSG D
	12,625	96	Weighted Average
	1,151		9.12% Pervious Area
	11,474		90.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

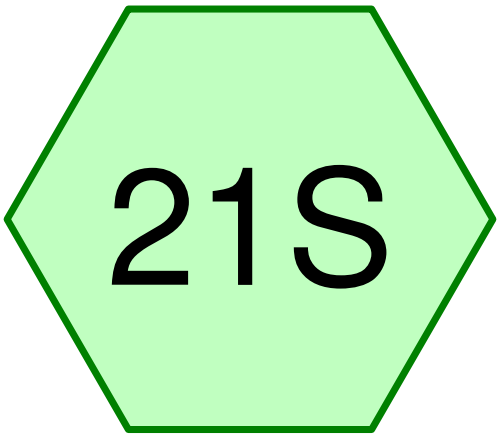
Summary for Reach 1R: Post Volume

Inflow Area = 2.576 ac, 82.84% Impervious, Inflow Depth = 3.51" for 10-Year event
Inflow = 13.15 cfs @ 12.13 hrs, Volume= 0.753 af
Outflow = 13.15 cfs @ 12.13 hrs, Volume= 0.753 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs



7 Green Infrastructure Calculations



Proposed Impervious

Subcat Reach Pond Link

Routing Diagram for MPM HydroCAD w Dry Storage
Prepared by HP Inc., Printed 5/1/2020

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.111	98	Impervious Area (21S)
2.111	**98**	**TOTAL AREA**

Summary for Subcatchment 21S: Proposed Impervious

Runoff = 1.07 cfs @ 12.13 hrs, Volume= 0.056 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 4 0.5" Storm Rainfall=0.50"

	Area (sf)	CN	Description
*	91,950	98	Impervious Area
	91,950		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

8 Erosion Control Calculations

Soil Loss & Sediment Discharge Calculation Tool

for use on Construction Sites in the State of Wisconsin

WDNR Version 2.0 (06-29-2017)

YEAR 1

Developer: MSR

Project: Madison Public Market

Date: 05/01/20

County: Dane

Version 1.0

Activity (1)	Begin Date (2)	End Date (3)	Period % R (4)	Annual R Factor (5)	Sub Soil Texture (6)	Soil Erodibility K Factor (7)	Slope (%) (8)	Slope Length (ft) (9)	LS Factor (10)	Land Cover C Factor (11)	Soil loss A (tons/acre) (12)	SDF (13)	Sediment Control Practice (14)	Sediment Discharge (t/ac) (15)
Bare Ground	11/01/20	06/01/21	23.5%	150	Silt Loam	0.43	0.9%	235	0.14	1.00	2.1	0.643	Inlet Protection	0.9
Bare Ground	06/01/21	08/01/21	43.1%	150	Silt Loam	0.43	1.6%	114	0.17	1.00	4.8	1.083	Inlet Protection	3.7
Seed with Mulch or Er	08/01/21	10/31/21	33.4%	150	Silt Loam	0.43	1.6%	114	0.17	0.10	0.4	1.083	Inlet Protection	0.3
End	10/31/21	-----	-----	-----	-------	-----			-----	------	-----	0.000		0.0
		-----	-----	-----	-------	-----			-----	-----	-----	0.000		0.0
		-----	-----	-----	-------	-----			-----	-----	-----	0.000		0.0
										TOTAL	**7.3**		**TOTAL**	**4.9**
													% Reduction Required	**NONE**

Notes:

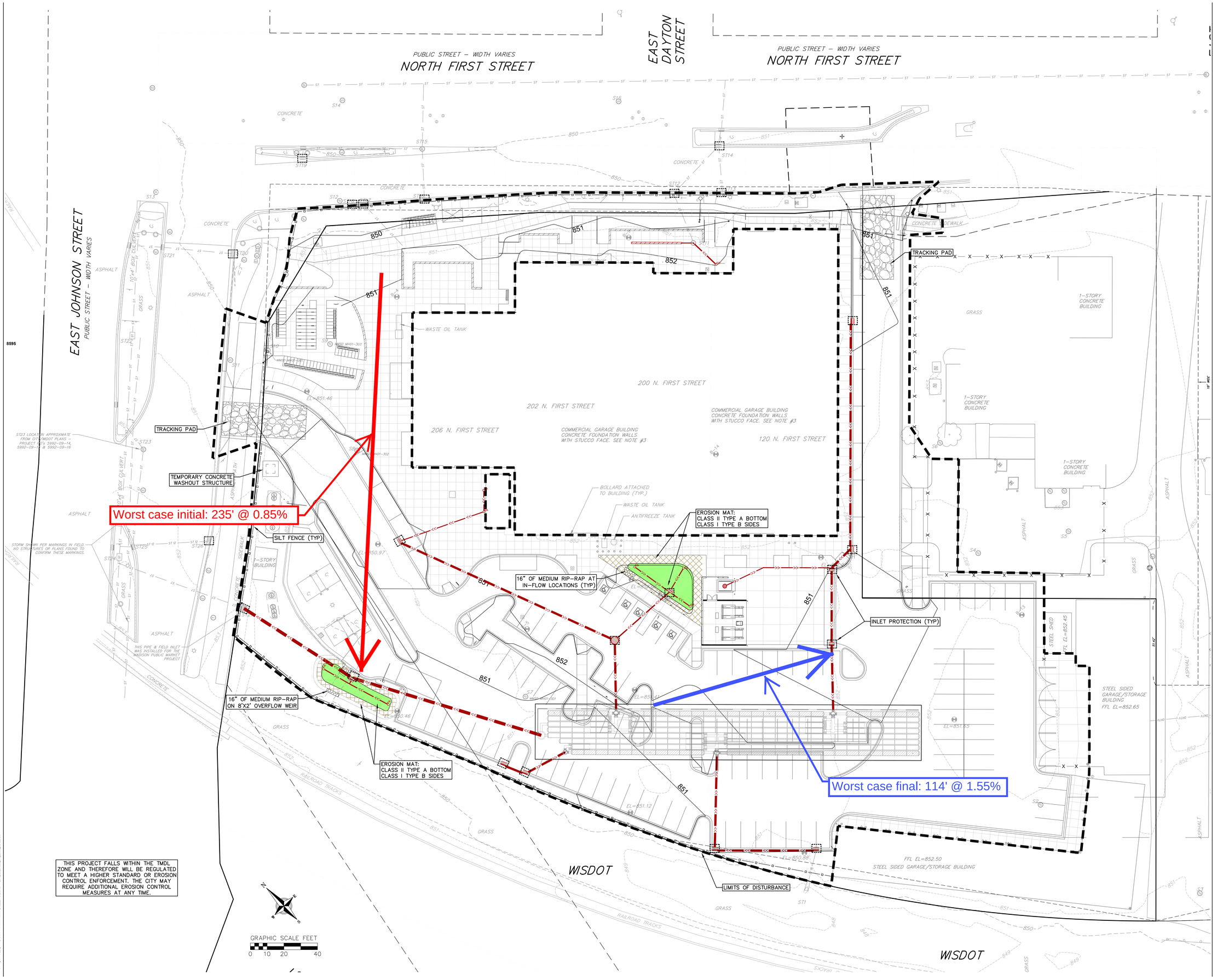
See Help Page for further descriptions of variables and items in drop-down boxes.
The last land disturbing activity on each sheet must be 'End'. This is either 12 months from the start of construction or final stabilization.
For periods of construction that exceed 12 months, please demonstrate that 5 tons/acre/year is not exceeded in any given 12 month period.

NOTE: THIS TOOL ONLY ADDRESSED SOIL EROSION DUE TO SHEET FLOW. MEASURES TO CONTROL CHANNEL EROSION MAY ALSO BE REQUIRED TO MEET SEDIMENT DISCHARGE REQUIREMENTS.

Recommended Permanent Seeding Dates:

4/1-5/15	and	8/7-8/29	Turf, introduced grasses and legumes
Thaw-6/30			Native Grasses, forbs, and legumes

Designed By:	Vierbicher
Date	5/1/2020



THIS PROJECT FALLS WITHIN THE TMDL ZONE AND THEREFORE WILL BE REGULATED TO MEET A HIGHER STANDARD OR EROSION CONTROL ENFORCEMENT. THE CITY MAY REQUIRE ADDITIONAL EROSION CONTROL MEASURES AT ANY TIME.

Architecture and Interiors
MSRDesign
510 Marquette Avenue South, Suite 200
Minneapolis, MN 55402 | 612. 375. 0336

MEP Engineer
MEP Associates, LLC
860 Blue Gentian Rd #175
Eagan, MN 55121 | 651, 379, 9120

Civil Engineer
Vierbicher
999 Fourier Dr, Suite 201,
Madison, WI 53717 | 608, 826, 0532

Landscape Architect
Ken Saiki Design
1110 S. Park St,
Madison, WI 53715 | 608, 251, 3600

Structural Engineering,
Fire Protection Engineering, Technology and AV
IMEG Corporation, Inc.
1800 Deming Way, Suite 200,
Madison, WI 53562

Lighting Design
Mazzetti, Inc.
1600 Stout St, Suite 450
Denver, CO 80202 | 720, 644, 5044

Commercial Kitchen Design
Boelter Premier
7120 Northland Terrace,
Minneapolis, MN 55428 | 763, 544, 8800

MADISON PUBLIC MARKET

202 N First St, Madison, WI 53703

Project No: 2019006.00

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Architect under the Laws of the State of Wisconsin.

Architect Seal

Signature _____

Print Name _____

Date _____ License No _____

100% CONSTRUCTION DOCUMENTS

ISSUE / REVISION

Mark	Date	Description
	06.04.2019	SITE + BUILDING DESIGN 1 PRICING ISSUE
	06.12.2019	UDC INFORMATIONAL SUBMISSION
	08.16.2019	SITE + BUILDING DESIGN 2 PRICING ISSUE
	11.13.2019	100% CDP DOCUMENTS
	02.18.2020	CD PRICING ISSUE
	04.30.2020	90% CONSTRUCTION DOCUMENTS
	06.04.2021	100% CONSTRUCTION DOCUMENTS

EROSION CONTROL PLAN

C201

9.1 Stormwater Maintenance Agreement

9.2 Site Photos

vierbicher
planners | engineers | advisors

Map 9.2: Existing Condition Photos (Index)
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

Photo 1

Photo 2

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planners | engineers | advisors

Existing Condition Photos
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

Photo 3

Photo 4

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Existing Condition Photos
Project Name: Madison Public Market
Project Location: City of Madison, Wisconsin

Photo 5

Photo 6

9.3 WDNR Wetland Concurrence Email

vierbicher
planners | engineers | advisors

Spencer Christiansen <schr@vierbicher.com>

Madison Public Market - Wetland Screening

Rortvedt, Eric - DNR <Eric.Rortvedt@wisconsin.gov> Tue, May 28, 2019 at 2:41 PM
To: Neil Pfaff <npfa@vierbicher.com>
Cc: Spencer Christiansen <schr@vierbicher.com>, Matt Schreiner <msch@vierbicher.com>, Gina Schultz <gsch@vierbicher.com>

Neil,

I concur that the project site outlined in red in the aerial site map does not include a wetland. The vegetated swale between the project site and the railroad tacks appears to have wetland vegetation so the project may not encroach into that swale without further wetland review and/or wetland permit.

Please submit this email as confirmation that further wetland review is not required to submit an stormwater NOI to the DNR.

Thanks

Eric Rortvedt, P.E.

Phone: (608) 273-5612

Eric.Rortvedt@Wisconsin.gov

[Quoted text hidden]

2 attachments

Wetland Screen - Madison Public Market.pdf
70K

Aerial Site Map.pdf
247K

8595

vierbicher
planners engineers advisors

Neil Pfaff <npfa@vierbicher.com>

Madison Public Market - Wetland Screening

1 message

Neil Pfaff <npfa@vierbicher.com> Tue, May 28, 2019 at 9:47 AM
To: Eric Rortvedt <eric.rortvedt@wisconsin.gov>
Cc: Spencer Christiansen <schr@vierbicher.com>, Matt Schreiner <msch@vierbicher.com>, Gina Schultz <gsch@vierbicher.com>

Eric-

Attached is a wetland screening for the Proposed Madison Public Market. The project will commence within the existing impervious footprint; therefore, no wetlands will be impacted as a result of the project.

Thank you,

Neil

--
Neil Pfaff, PH, PE, CST

Vierbicher
400 Viking Drive
Reedsburg, Wisconsin 53959
Direct Phone: (608) 768-4806
Phone: (608) 524-6468
Fax: (608) 524-8218
www.vierbicher.com

7 attachments

- **Wetland Screen - Madison Public Market.pdf** 70K
- **USGS Quad Map.pdf** 104K
- **Aerial Site Map.pdf** 247K
- **SWDV Wetland Map.pdf** 175K
- **Site Photos - Existing Conditions.pdf** 375K
- **NRCS Soils Map.pdf** 427K
- **Historical Aerial Photos.pdf** 4052K

8595

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May 14, 2019

Eric Rortvedt
Water Resources Engineer
Wisconsin Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg, WI 53711

Re: Onsite Wetland Screening
Madison Public Market
Madison, Wisconsin

On May 8, 2019 a wetland screening was conducted for the site located at 200 N First Street in Madison, Wisconsin. The site is approximately 3.4 acres in size. The proposed development includes a two story, city owned, multipurpose facility that will be used for providing local foods, arts, and goods. Nearby water bodies include the Yahara River, Lake Mendota and Lake Monona. The wetland screening area encompasses the existing, developed area. The grass swale west of the property, adjacent to the railroad tracks, was also evaluated and is included in the photo log. An existing 18-inch pipe drains stormwater from the site to the grass swale. This area is not within the proposed development and therefore will not be disturbed.

The attached photo log depicts the site's existing impervious condition and the offsite grass swale. Based on the proposed construction plans, the disturbance is within the boundary of existing impervious areas.

We believe no further wetland investigation will be required. We would appreciate your confirmation that no additional wetland investigation is required for the site per the existing proposed plan

If you have any questions please feel free to contact me at 608-768-4806 or npfa@vierbicher.com.

Thank you,

Neil Pfaff, PE, PH, CST

Enclosure(s): May 8, 2019, Site Photos - Existing Conditions
Surface Water Data Viewer Map with Area of Wetland Concern
Historical Aerial Photographs
USGS Map
Site Map

M:\MSR (Meyer, Scherer & Rockcastle Ltd)\180275_Madison Market\Design Development\Wetland Screening

vierbicher
planners | engineers | advisors

Aerial Map
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI

Historical Aerial Photos
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI
Page (1)

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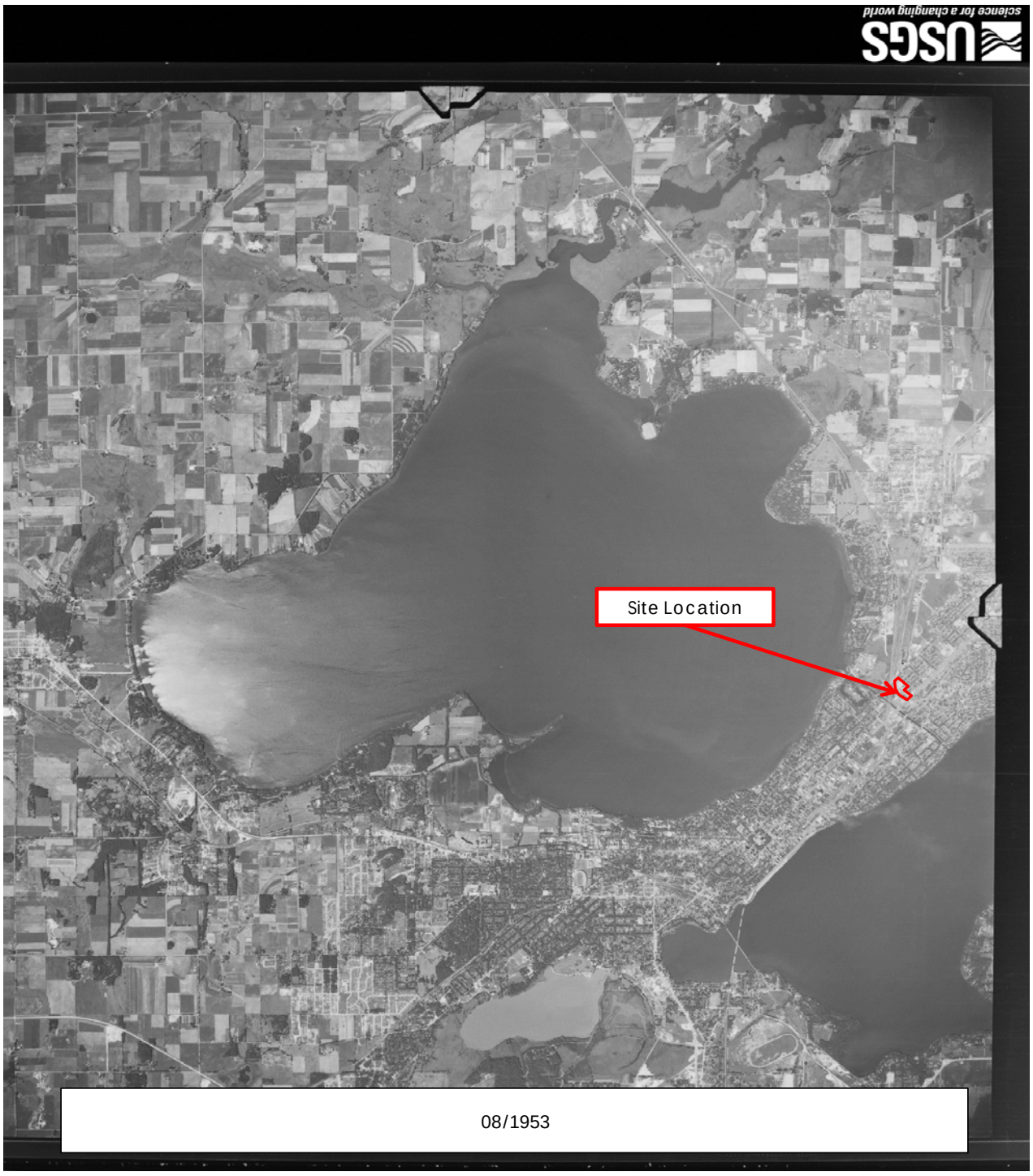

Historical Aerial Photos
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI
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Historical Aerial Photos
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI
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Project Name: Madison Public Market
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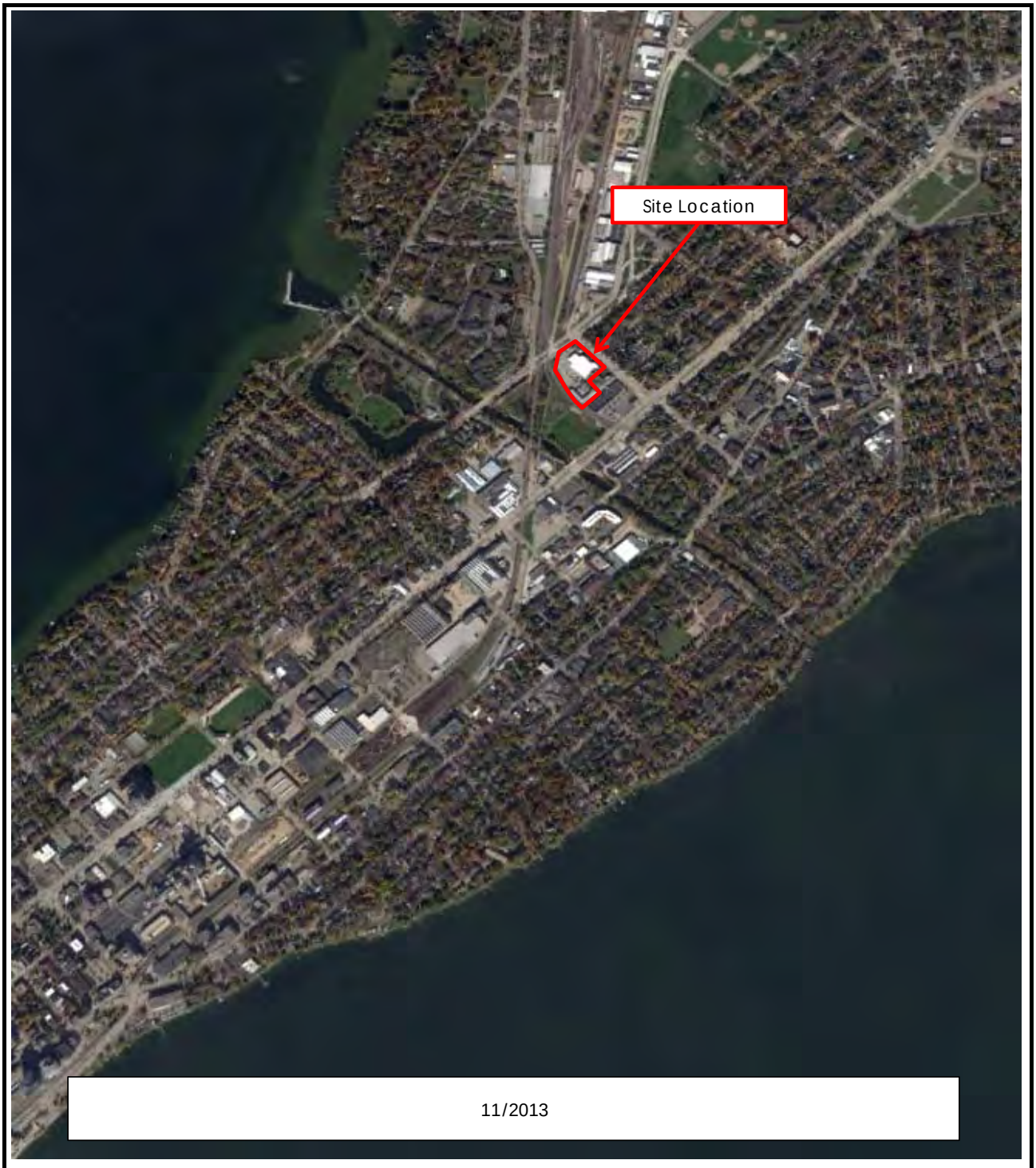

Historical Aerial Photos
Wetland Screening
Project Name: Madison Public Market
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Historical Aerial Photos
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI
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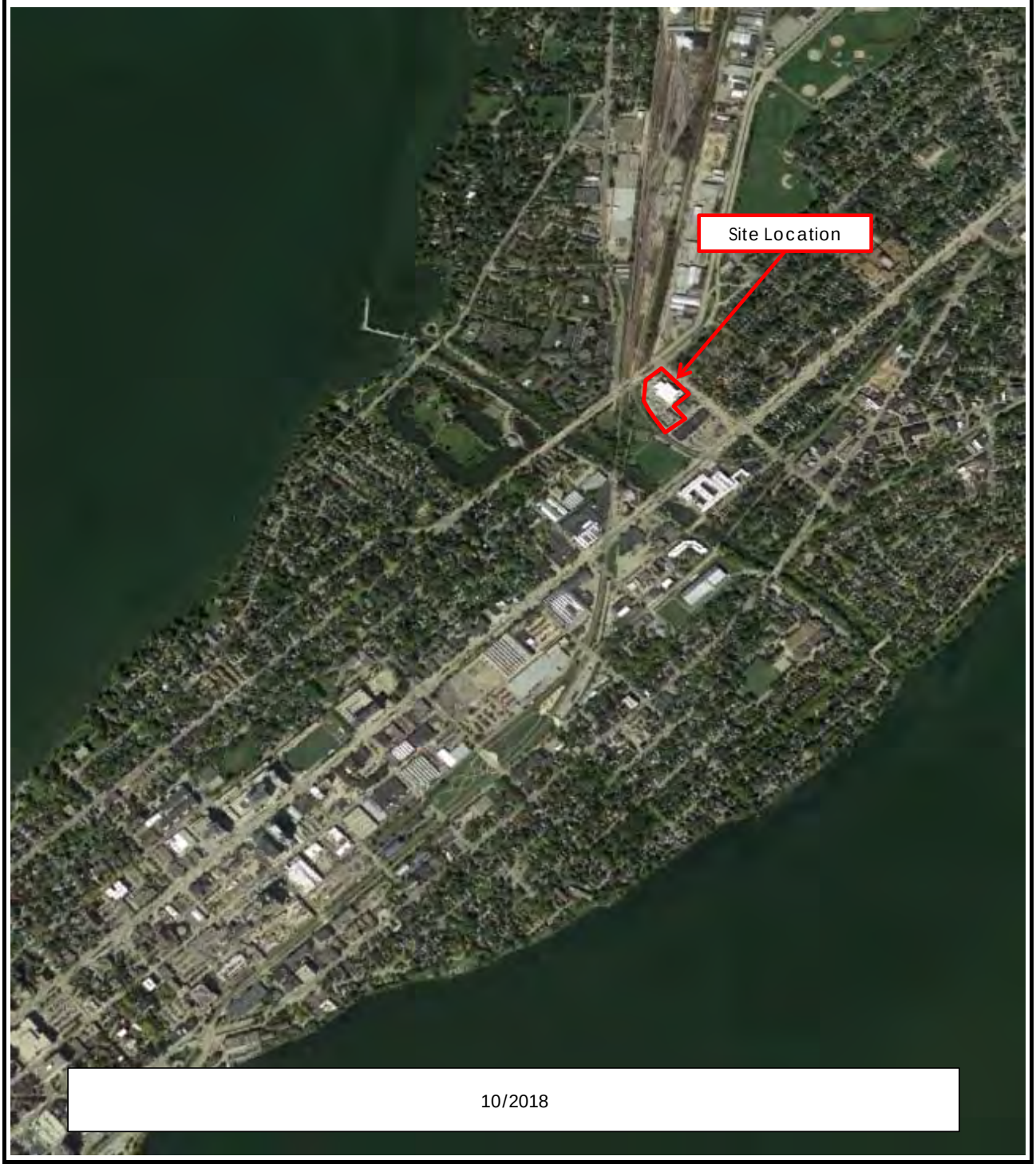

Historical Aerial Photos
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI
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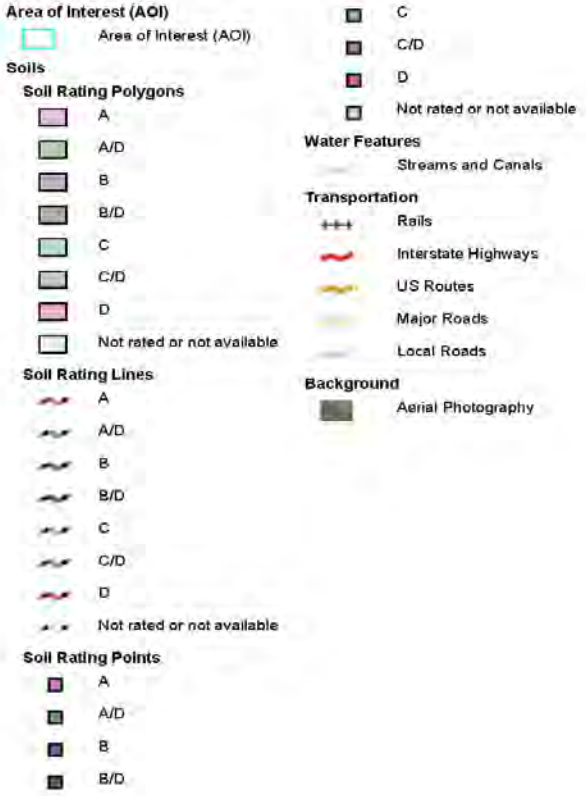
NRCS Soils Map
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI

MAP LEGEND



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sauk County, Wisconsin
Survey Area Data: Version 16, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 1, 2011—Feb 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

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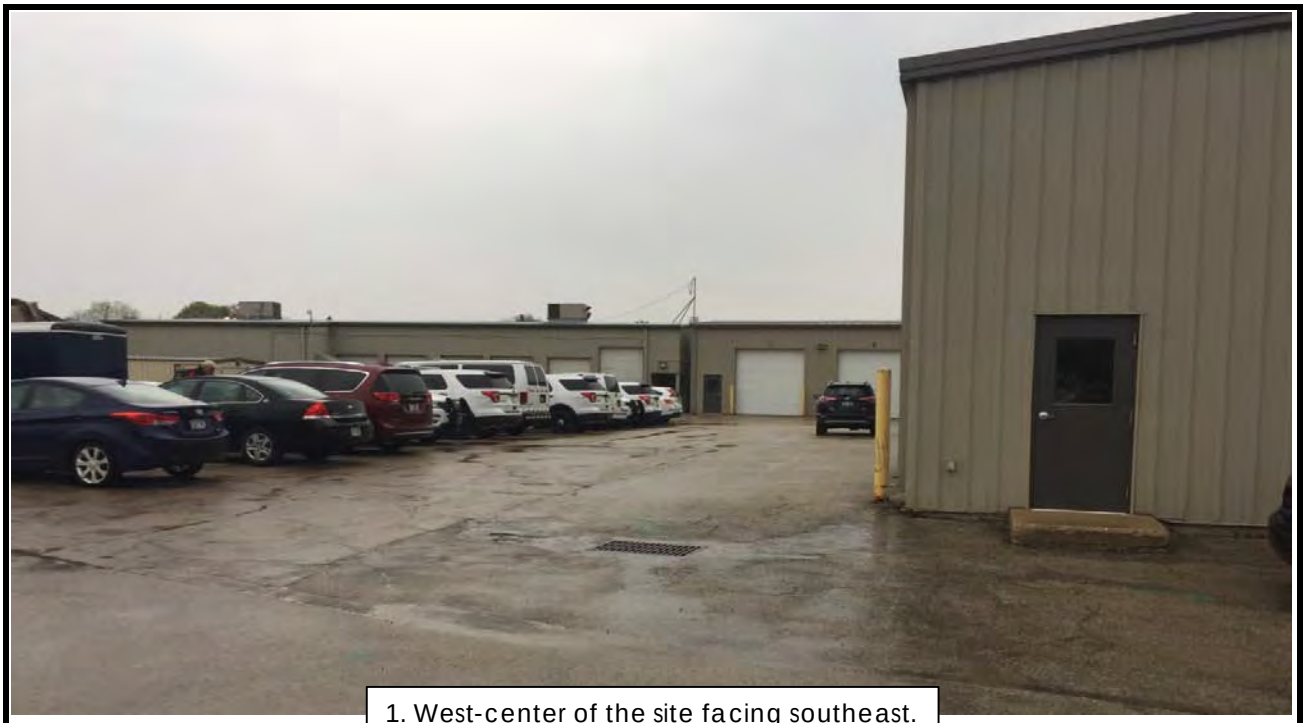
NRCS Soils Map
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BbB	Batavia silt loam, gravelly substratum, 2 to 6 percent slopes	B	20.4	17.4%
Co	Colwood silt loam, 0 to 2 percent slopes	C/D	55.2	47.1%
DnB	Dodge silt loam, 2 to 6 percent slopes	C	24.1	20.6%
MdC2	McHenry silt loam, 6 to 12 percent slopes, eroded	B	1.3	1.1%
VwA	Virgil silt loam, gravelly substratum, 0 to 3 percent slopes	B/D	13.1	11.2%
W	Water		3.1	2.7%
Totals for Area of Interest			**117.2**	**100.0%**



1. West-center of the site facing southeast.

2. Center of the site facing north.

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Existing Conditions Site Photos: Date Taken - May 8, 2019
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI
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3. Center of the site facing southeast.

4. North of the site facing southeast.

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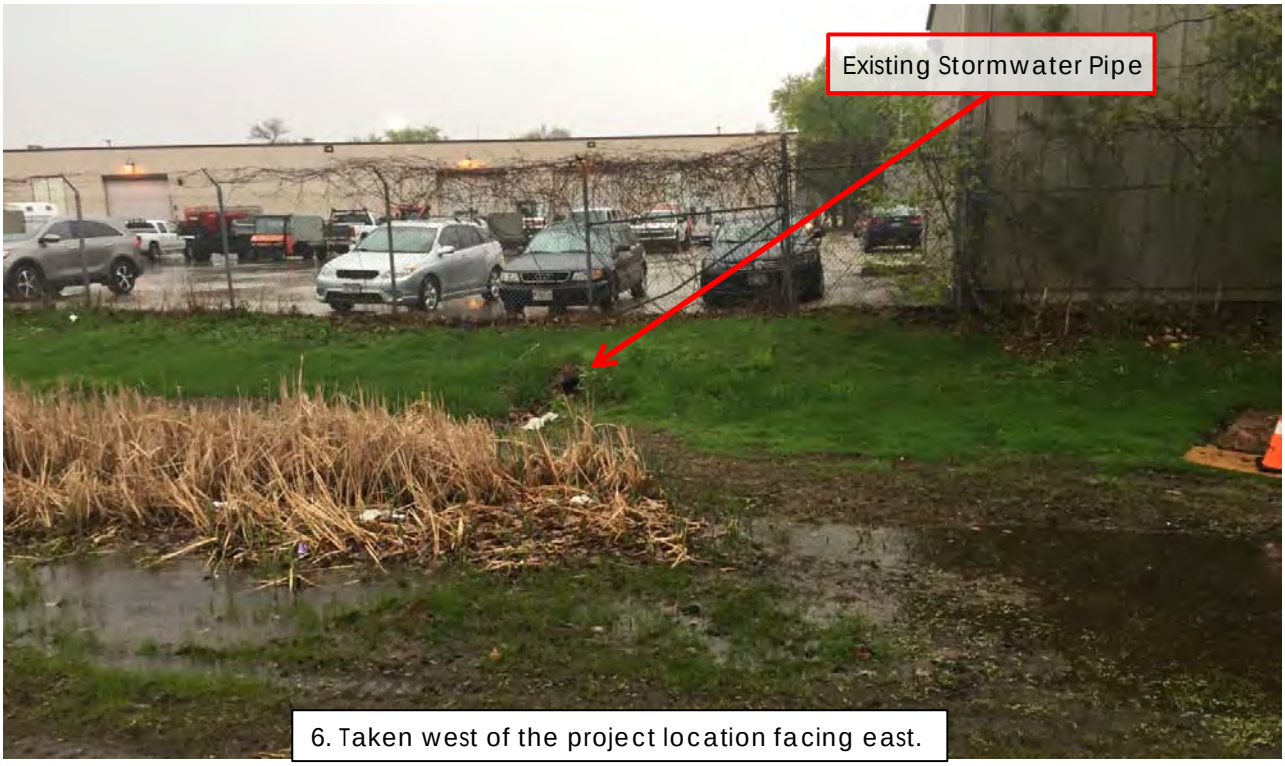
Existing Conditions Site Photos: Date Taken - May 8, 2019
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI

5. Taken on the west side of the project facing southwest.



6. Taken west of the project location facing east.

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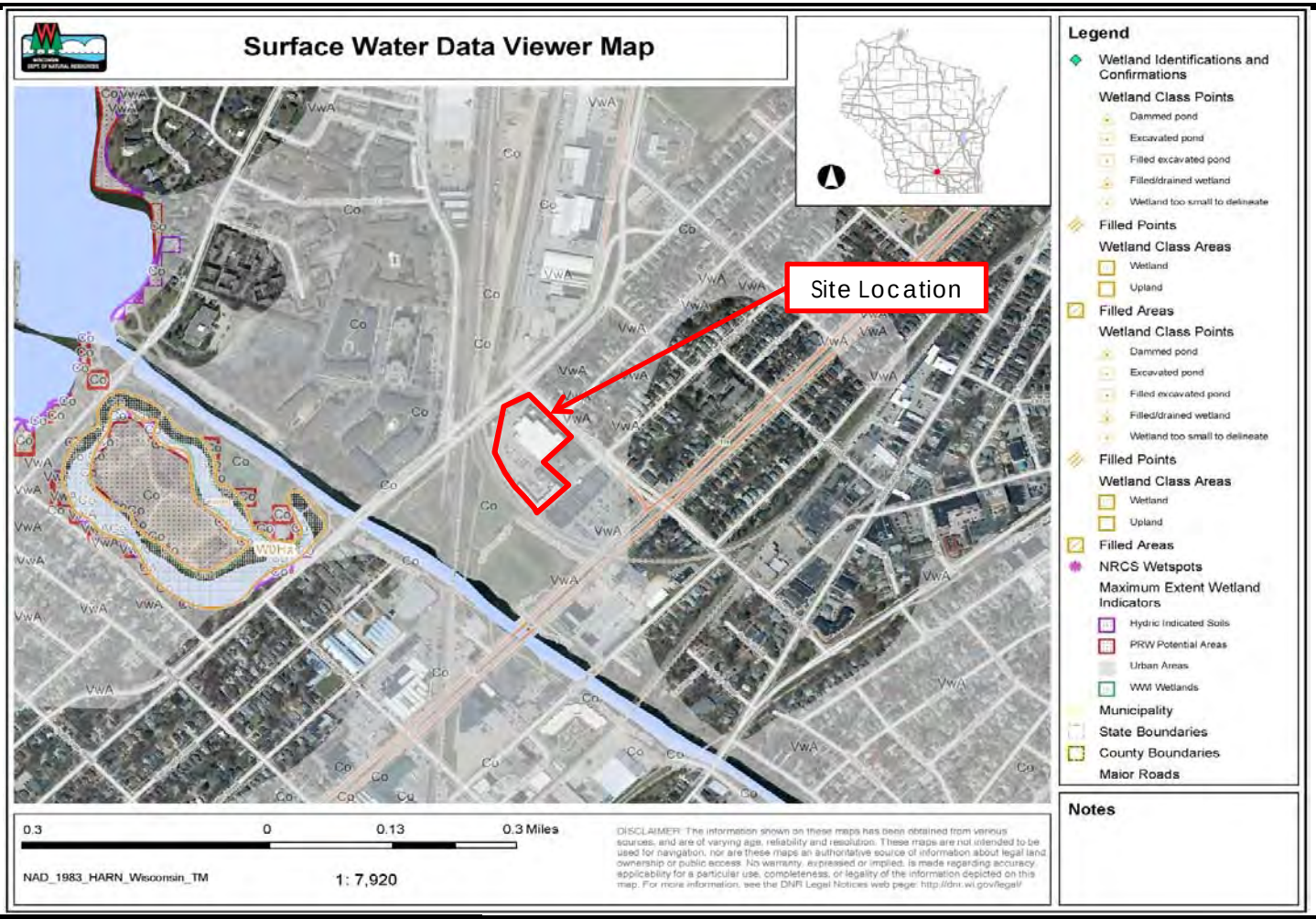
Existing Conditions Site Photos: Date Taken - May 8, 2019
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI
Page (3)



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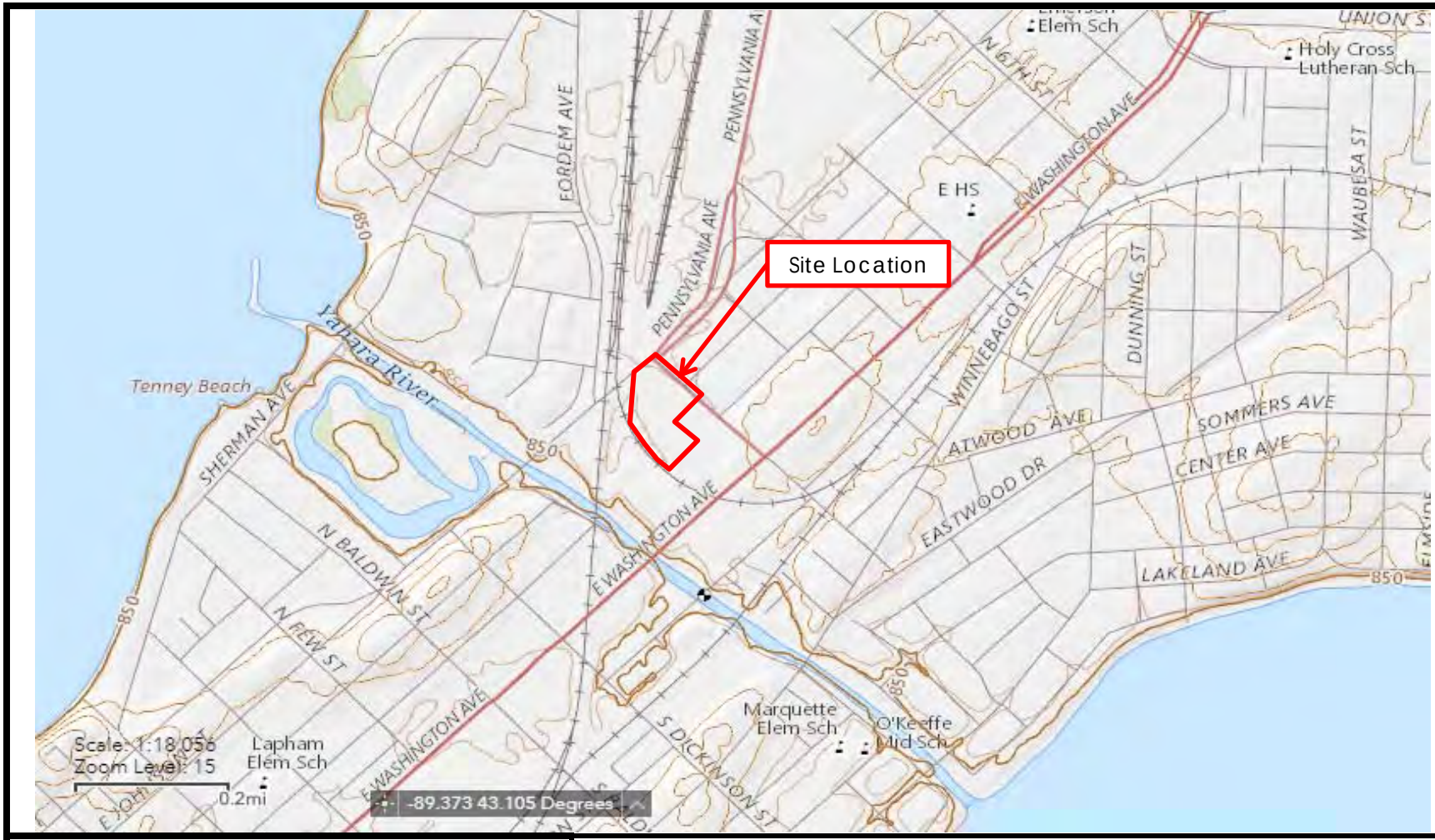
WDNR Surface Water Data Viewer Wetland Map
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI



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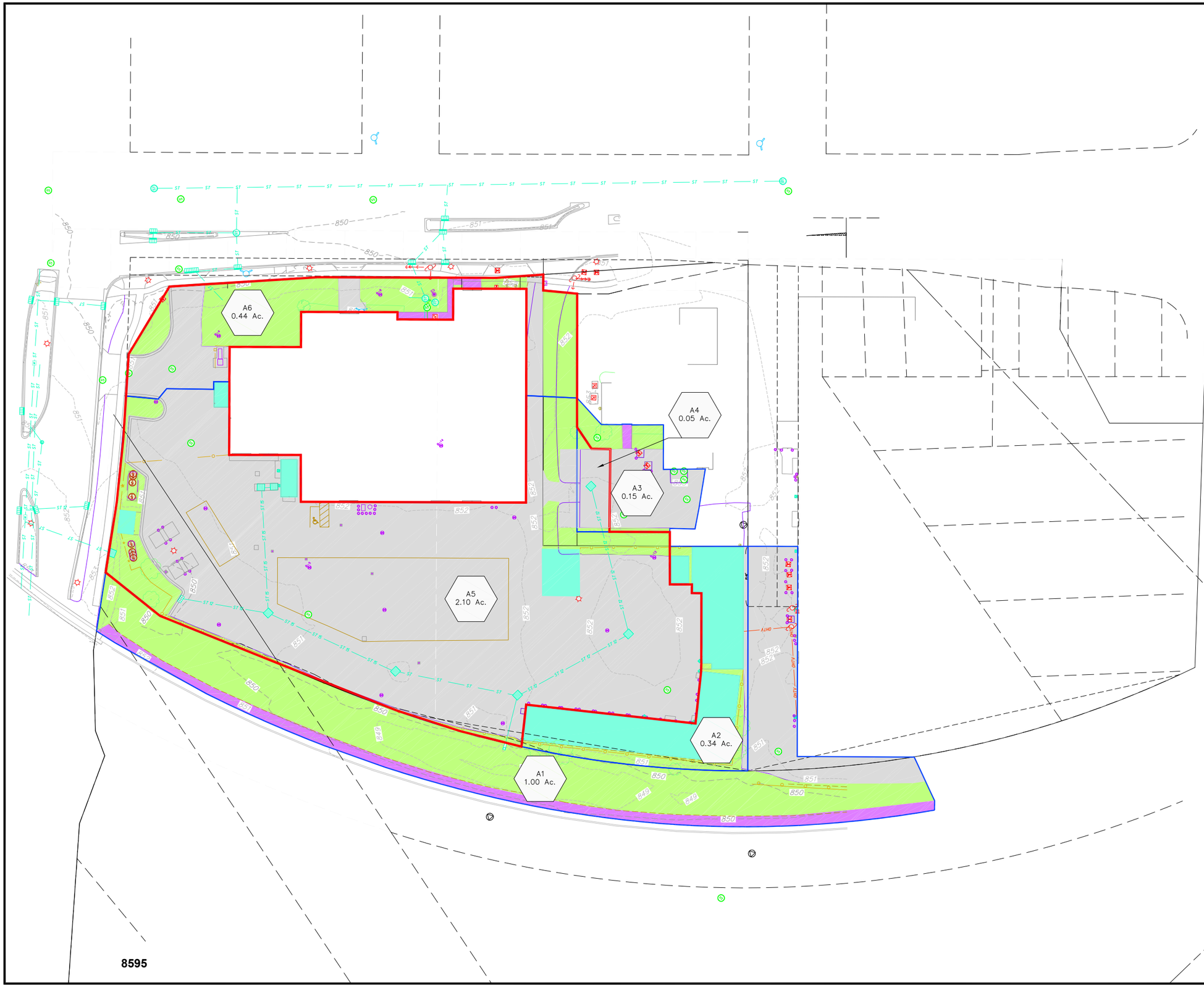
USGS Quad Map
Wetland Screening
Project Name: Madison Public Market
Project Location: City of Madison, Dane County, WI

9.4 Pre-Developed Drainage Map



GRAPHIC SCALE FEET
0 20 40 80

STORMWATER LEGEND

- PARKING
- LANDSCAPE
- ROOF
- SIDEWALK
- EXISTING WATERSHED
- PROJECT SITE LIMITS

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Pre-Developed Watershed Map

Madison Public Market - 200 N First Street
City of Madison
Dane County, WI

REVISIONS

NO.	DATE	REMARKS

REVISIONS

NO.	DATE	REMARKS

SCALE
AS SHOWN

DATE
05-01-2020

DRAFTER
SCHR

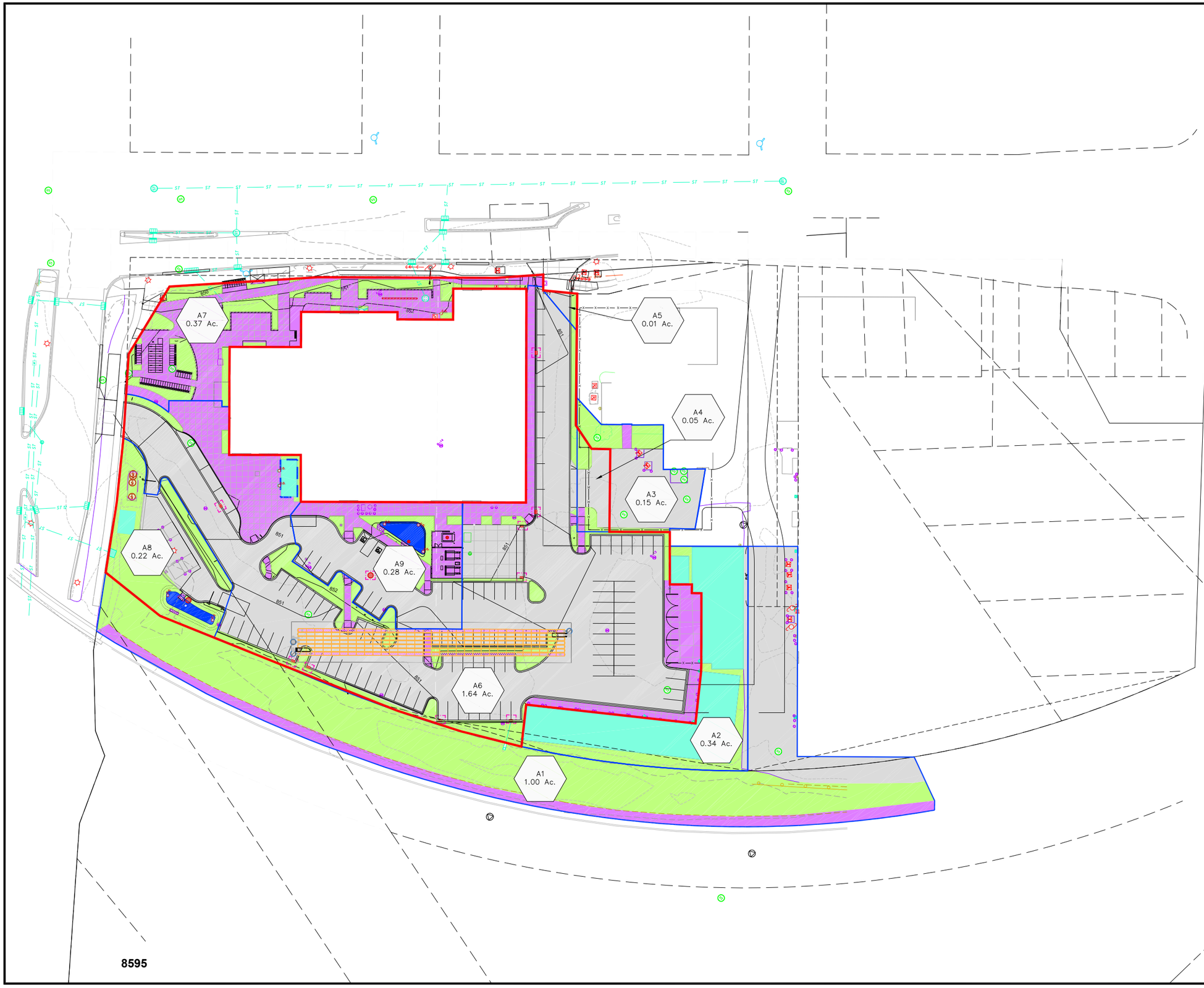
CHECKED
MSCH/TSCH

PROJECT NO.
180275

C

9.4

9.5 Developed Drainage Map



GRAPHIC SCALE FEET
0 20 40 80

STORMWATER LEGEND

- PARKING
- LANDSCAPE
- ROOF
- SIDEWALK
- STORMWATER FACILITY
- PROPOSED WATERSHED
- PROJECT SITE LIMITS

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Post-Developed Watershed Map

Madison Public Market - 200 N First Street
City of Madison
Dane County, WI

REVISIONS			REVISIONS		
NO.	DATE	REMARKS	NO.	DATE	REMARKS

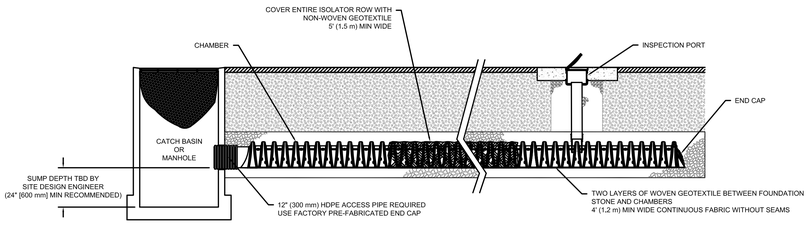
SCALE: AS SHOWN
DATE: 05-01-2020
DRAFTER: SCHR
CHECKED: MSCH/TSCH
PROJECT NO.: 180275

C
9.5

01 May 2020 - 3:36p M:\WSR (Meyer, Scherer & Rockcastle Ltd)\180275_Madison Market\CADD\180275 - Stormwater.dwg by: schr

9.6 Construction Plans

ARCH CHAMBER STORMWATER DETENTION SYSTEM



ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1,1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS,

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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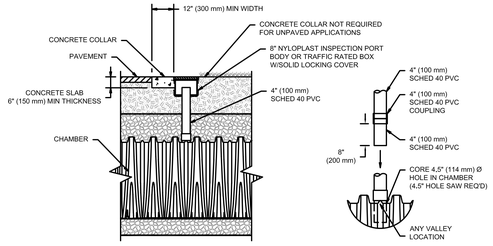
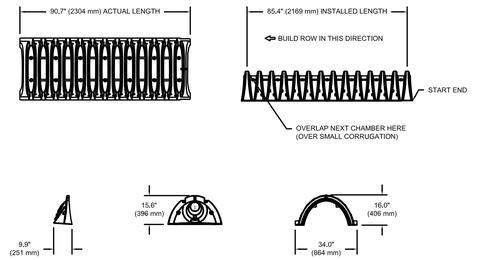


NOTES:
1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.
2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED (4" PVC).

4" PVC INSPECTION PORT DETAIL
NTS

CONNECTION DETAIL
NTS

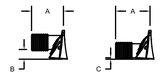
TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0,42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0,88 m³)
WEIGHT	35.0 lbs.	(16,8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS



STUB	A	B	C
6" (150 mm)	9,6" (244 mm)	5,8" (147 mm)	---
		---	0,5" (13 mm)
8" (200 mm)	11,9" (302 mm)	3,5" (89 mm)	---
		---	0,6" (15 mm)
10" (250 mm)	12,7" (323 mm)	1,4" (36 mm)	---
		---	0,7" (18 mm)
12" (300 mm)	13,5" (343 mm)	---	0,9" (23 mm)

ALL STUBS, EXCEPT FOR THE 12" ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP.

* FOR THE 12" (300 mm), STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0,25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

NOTE:
DETAILS ARE FOR REFERENCE ONLY.
CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO ENGINEER AND CITY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

Architecture and Interiors
MSRDesign
510 Marquette Avenue South, Suite 200
Minneapolis, MN 55402 | 612. 375. 0336

MEP Engineer
MEP Associates, LLC
860 Blue Gentian Rd #175
Eagan, MN 55121 | 651, 379, 9120

Civil Engineer
Vierbicher
999 Fourier Dr, Suite 201,
Madison, WI 53717 | 608, 826, 0532

Landscape Architect
Ken Saiki Design
1110 S. Park St,
Madison, WI 53715 | 608, 251, 3600

Structural Engineering,
Fire Protection Engineering, Technology and AV
IMEG Corporation, Inc.
1800 Deming Way, Suite 200,
Madison, WI 53562

Lighting Design
Mazzetti, Inc.
1600 Stout St, Suite 450
Denver, CO 80202 | 720, 644, 5044

Commercial Kitchen Design
Boelter Premier
7120 Northland Terrace,
Minneapolis, MN 55428 | 763, 544, 8800

MADISON PUBLIC MARKET
202 N First St, Madison, WI 53704

Project No: 2019006.00

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Architect under the Laws of the State of Wisconsin.

Architect Seal

Signature _____

Print Name _____

Date _____ **License No** _____

CD PRICING ISSUE

ISSUE / REVISION

Mark	Date	Description
	06.04.2019	SITE + BUILDING DESIGN 1 PRICING ISSUE
	06.12.2019	UDC INFORMATIONAL SUBMISSION
	08.16.2019	SITE + BUILDING DESIGN 2 PRICING ISSUE
	11.13.2019	100% CDP DOCUMENTS
	02.18.2020	CD PRICING ISSUE
	05.01.2020	90% CONSTRUCTION DOCUMENTS

CONSTRUCTION
DETAILS - 6

C-406

NOT FOR CONSTRUCTION

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SECTION 00 31 46
PERMITS

PART 1 – GENERAL

1.1. SUMMARY

A. Each project has varying requirements for permits, inspections, and fees based on the scope, size, and location of the project.

B. The City of Madison (Owner) is subject to all permits, inspections and associated fees for construction, demolition, utility connection, storm water management, and other similar requirements that may be required to complete the scope of work associated with these contract documents.

C. The General Contractor (GC) shall be responsible for obtaining all permits, inspections and paying for all associated fees unless specifically identified within this specification.

1.2. REFERENCES

A. The following references are not intended to be all inclusive. It shall be the GC's responsibility to determine all requirements based on the scope of work in the contract documents.

B. City of Madison Ordinances: Review all ordinances that may require a permit or fee that may be connected with a required permit. Contact the following City Agencies to determine the exact requirements during bidding

1. Building Inspection
2. Zoning
3. Engineering
4. Water Utility
5. Traffic Engineering
6. Others as may be specified by the contract documents.

B. State Statutes

C. Other Regulatory Regulations

D. Other Agencies or companies that may have related requirements

1. Madison Metropolitan Sewerage District
2. Local gas and electric utility companies
3. Other utility companies

1.3. GENERAL CONTRACTORS REQUIREMENTS

A. The GC shall be responsible for all of the following:

1. Execute application for all required permits as may be required by the scope of work described within the contract documents.
2. Paying all fees associated with the application of any required permits.
3. Scheduling all required inspections that may be conditions of any required permits.

B. The GC shall provide high quality scanned images of all required permits and inspections and upload them to the Contract Documents-Regulatory Documents Library on the Project Management Web Site.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 00 43 25
SUBSTITUTION REQUEST FORM (DURING BIDDING)

PART 1 – GENERAL

1.1. SUMMARY

A. The City of Madison uses a specific list of preferred products for various specification items to establish standards of quality, utility, and appearance required.

B. The City of Madison will not allow substitutions for specified Products except as follows:

1. The Product is no longer produced or the product manufacturer is no longer in business.
2. The manufacturer has significantly changed performance data, product dimensions, or other such design criteria for the specified Product(s).
3. Products specified by naming one or more Products or manufacturer's and "or approved equal" or "approved equivalent."

C. The procedures in this specification shall apply to all proposals by Contractors, Suppliers, Vendors, and Manufacturers when the conditions in item 1.1.B. above have been met during the bidding phase.

1.2. RELATED SPECIFICATIONS

A. 01 25 13 Product Substitution Procedures

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. REQUESTING A SUBSTITUTION DURING BIDDING

A. In the event that a substitution is requested during the bidding phase the Contractor, Supplier, Vendor, or Manufacturer shall do all of the following:

1. Submit a Substitution Request Form for each different product. Use a printed/scanned copy of the form at the end of this specification as a cover sheet.
2. Support your request with complete data, drawings, specifications, performance data and samples as appropriate. A complete submission shall include the following:
   a. Substitution Request Form as a cover sheet
   b Comparison of qualities of the proposed substitutions with that specified.
   c. Changes required in other elements of the Work because of the substitution.
   d. Effect on the construction schedule.
   e. Cost data comparing the proposed substitution with the Product specified.
   f. Any required license fees or royalties.
   g. Availability of maintenance service and source of replacement materials.
3. Submit the Substitution Request Form and all required supporting documentation to the City Project Manager and Project Architect.
   a. Submissions to be done as complete PDF files for each product, appropriately titled
   b. Email submissions to the Project Architect and City Project Manager at the email addresses provided on the last page of Section D of the contract documents.
      i. The subject line shall include the contract number and "Request for Substitution". Example: Contract 1234 – Request for Substitution
4. Submissions must be received by the substitution request deadline specified in Section A of the Contract Documents.

3.2. SUBMISSION REVIEW

A. The Project Architect, City Project Manager, members of the design team, and the Owners staff shall review all submissions for substitutions during the bidding phase.

3.3. SUBSTITUTION APPROVAL

A. All requests for substitutions that have been approved shall be published by Addenda to the bid documents.

NOTE SEE NEXT PAGE FOR SAMPLE SUBSTITUTION REQUEST FORM.

3.4. SUBSTITUTION REQUEST FORM

For Pre-bid Substitution Requests all text boxes on this form are required information for a complete request.

Substitution Request

Today's Date:

Project Title:

Project Number: *Contract Number:*

By completing and submitting this form for review the General Contractor affirms that all of the following statements are correct:

1. The General Contractor affirms that this request is in compliance with the requirements described in ***Specification 01 25 13 Product Substitution Procedures.***
2. The function, appearance, and quality of the proposed substitution are equal or superior to the specified item.
3. The proposed substitution does not affect dimensions shown on the drawings.
4. The proposed substitution will have no adverse affects on other trades, the construction schedule, or any specified warranty requirements.
5. Maintenance and service parts will be locally available for the proposed substitution. (GC shall provide supporting documentation in the attachments section below.)
6. The General Contractor shall be responsible for any and all costs associated with this substitution request if approved. This includes but is not to limited to fees for building design, engineering design fees, detailing fees, plan review fees, construction costs, and inspection fees.

GC Substitution Request:

General Title:

Related Specification:

Reason for Substitution:

Proposed Substitution:
(include Name, Model, etc.)

Submitted By: *Phone:*

Company: *Email:*

END OF SECTION

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SECTION 00 43 43
WAGE RATES FORM

PART 1 – GENERAL

1.1. SUMMARY

A. The Reimbursable Hourly Worksheet is a contractor provided document that indicates the basic rate of pay, fringe benefits, and each companies cost of required insurance for all Trades and Classifications that will be performing productive labor during the execution of this contract.
   1. Rates shall be similar to recognized rates published by the Bureau of Labor Statistics, Associated General Contractors (AGC), Associated Builders and Contractors (ABC), appropriate union contracts, and other similar organizations or documents.

B. The Reimbursable Labor Rate Worksheet shall provide the basis for labor rates being used on Change Order Request forms.

1.2. RELATED SPECIFICATIONS

A. Section 01 26 57 Change Order Request
B. Section 01 29 76 Progress Payment Procedures
C. Section 01 31 23 Project Management Web Site (SharePoint)
D. Section 01 32 19 Submittals Schedule

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1. GENERAL REQUIREMENTS

A. Prior to the Pre-Construction Meeting the City Project Manager (CPM) or the City Construction Manager (CCM) shall provide the GC a copy of the *Reimbursable Labor Rate Worksheet.xls*.
   1. See the last page of this specification for an example of the worksheet.

B. The GC shall provide all subcontractors that will be performing productive labor during the execution of this contract with additional copies of the worksheet as needed.

C. All contractors shall be required to fill out and submit completed worksheets for all Trades and Classifications of labor that will be performing productive labor during the execution of this contract.

3.2. GENERAL CONTRACTORS RESPONSIBILITIES

A. The GC shall consolidate all Trades and Classifications into one master Excel Workbook of all trades.

B. The GC shall provide the combined workbook as required by Section 1.6 of Specification 01 32 19 Submittals Schedule for review and approval by the Owners Representatives.
   1. Submittal shall be an Exported PDF of the completed Excel Workbook.
      a. As an Exported PDF the individual worksheets will be bookmarked and the document will be word searchable for easy reference.

C. The GC shall only use the rates posted in the approved submittal throughout the execution of this contract.

1
2

Reimbursable Hourly Rate Worksheet

(see bottm of page for instructions)

Project Name:
Project Location:
Project Number:
Contractor:
Rates are based on the following documentaton:

Enter TRADE Here:
Carpenter

Classification:		Foreman	Journeyman	Laborer	Apprt 1	Other	Other	Other
Base Rate (BR)		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vacation		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Health Insurance		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Pension		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Apprenticeship		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Sub-total		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
BR Sub-total		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Work. Comp	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Gen Liability	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WI Unemploy	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Fed Unemploy	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
FICA	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Sub-total		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TOTAL COST		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Enter **YOUR** percentage of base rate in the column below.

% of BR	
0	- Work. Comp
0	- Gen Liability
0	- WI Unemploy
0.6	- Fed Unemploy
7.65	- FICA

Form Instructions:

1. Provide a work sheet for ALL Trade Classifications that will be performing on site productive labor during the execution of this project.

2. Responsible contractor to complete only boxes that are shaded, all non-shaded boxes are formula driven.

3. Contractor shall provide the name of the source used for these rates. (union contract, Bureau of Labor and Statistices, AGC, ABC, etc.) and be prepared to provide copies if so requested.

3
4
5
6
7
8

END OF SECTION

SECTION 00 62 76.13
SALES TAX FORM

PART 1 – GENERAL

1.1. SUMMARY

A. The City of Madison is a qualifying tax exempt entity in the State of Wisconsin.

B. The Contractor shall refer to *Section 102.9 – Bidders Understanding* of the *City of Madison Standard Specifications for Public Works Construction* for more information on Tax Exempt Status.

C. This project constructs or remodels facilities owned by the City of Madison in Madison, Wisconsin.

1.2. RELATED SPECIFICATION SECTIONS

A. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".

1. Use the following link to access the Standard Specifications web page:
   http://www.cityofmadison.com/business/pw/specs.cfm
   a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
   b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.

1.3. TAX EXEMPT FORM

A. The Contractor can access Wisconsin Sales and Use Tax Exemption Certificates (form S-211, Wisconsin Department of Revenue) from the City of Madison Finance website.

1. City of Madison tax exempt information and signature by Purchasing Supervisor is already completed.
2. Website: http://www.cityofmadison.com/employeenet/finance/purchasing
   a. Under the title *Purchasing Forms*, scroll down to the form link titled *Sales Tax Exempt Form S-211*.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Work by Owner.
2. Future work.
3. Owner-furnished products.
4. Coordination with occupants.
5. Specification and drawing conventions.

B. Related Requirements:
1. Section 01 81 13.14 “Sustainable Design Requirements” for submittal and product requirements.
2. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

B. Preceding Work: Owner will perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.
1. Reconstruction of streets, sidewalks and right-of-ways along E Johnson and E 1st Streets shall have been completed.
2. Owner shall decommission and remove from project site, any equipment noted on drawings to be ‘removed by Owner’. Including used oil reservoirs and other pieces of equipment related to the building’s former use as a City Fleet Services Garage.

C. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.
1. Owner shall install BALE-1 and LIFT-1 as indicated and provided for in Drawings and Specified in Division 11 Section 11 51 00 and Section 11 13 19 respectively.
2. Owner shall coordinate with Owner’s Trash Services Vendor to select final compacting dumpster equipment (DUMP-1 as noted in drawings and Master Equipment List) and shall provide coordinating information as required. Owner’s Trash Services Vendor shall provide equipment compatible with design provisions for space and electrical at trash enclosure.
3. Contractor shall allow Owner access during work hours to construction for installation of A/V and IT equipment.

D. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory Work under this Contract.
1. Owner shall furnish and install all kitchen equipment noted on food service (FS) drawings and Specifications Section 11 40 00 - Food Service Equipment. Note that ONLY equipment noted

specifically in these locations shall be Owner Furnished and Installed. Equipment described elsewhere shall be furnished and Installed by GC.

2. Owner shall install balance of all equipment noted as Owner installed as noted on Master Equipment List (Section 11 51 00).

1.4 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work of the GC includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections.

B. Owner-Furnished Products:

1. Refer to Drawings and MEP speculations.

1.5 COORDINATION WITH OCCUPANTS

A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.6 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

ID	Short Name	Section	Spec Data
ACPNL-1	RIGID BOARD ACOUSTIC INSULATION	057500	MFR: OWENS CORNING MODEL: SELECT SOUND BLACK ACOUSTIC BOARD THICKNESS: 2";
ACRYLIC-1	SOLID ACRYLIC PANEL	095113	MFR: PLAZIT POLYGAL STYLE: SOLID ACRYLIC SHEET MODEL: PLAZCRYL COLOR: CLEAR w/ FILM-1 THICKNESS: 10MM NOTEs: PROVIDE MANUF'S STANDARD EDGE TRIM AND COMPATIBLE DUAL CHANNEL CONNECTOR FOR JOINTS;
ACRYLIC-2A	ACRYLIC - SIGNAGE	10 14 23	MFR:ENCOMPASS STYLE:ECO-PRESS ACRYLIC GAUGE: 1/8" THICK PAINTED TO MATCH PT-A NOTES: SEE SIGNAGE SHEETS AND DETAILS;
ACRYLIC-2B	ACRYLIC - SIGNAGE	10 14 23	MFR:ENCOMPASS STYLE:ECO-PRESS ACRYLIC GAUGE: 1/8" THICK PAINTED TO MATCH PT-B NOTES: SEE SIGNAGE DETAILS FINISH TO BE STANDARD SUEDE;
ACRYLIC-3A	ADA RAISED LETTERING AND BRAILLE	10 14 23	MFR:DESIGNER SIGN STYLE: STANDARD TEXT AND BACKGROUND ADA COLORS COLOR: 3X1-413 CINDER NOTEs: SEE SIGNAGE DETAILS;
ACRYLIC-3B	ADA RAISED LETTERING AND BRAILLE	10 14 23	MFR:DESIGNER SIGN STYLE: STANDARD TEXT AND BACKGROUND ADA COLORS COLOR: 3X1-305 LIGHT GREY NOTEs: SEE SIGNAGE DETAILS;
ACTU-1	DOOR ACTUATOR	087100	MFR: BEA STYLE: 36 inch full length actuator MODEL: LPR36 COLOR: CLEAR COAT STAINLESS STEEL ;
ACTU-2	DOOR ACTUATOR	087100	MFR: BEA STYLE: 4.75 inch actuator MODEL: 4.75 IN SQUARE PUSH PLATE COLOR: CLEAR COAT STAINLESS STEEL ;
ALUM-1	ALUMINUM SPANDREL PANEL	084413	
ART-1	PICTURE HANGER REVEAL	092900	MFR: FRY REGLET STYLE: DA-10 RECESSED PICTURE HANGING SYSTEM COLOR: MATCH WALL ACCESSORIES: DRMH-50, QTY (20);
BAFL-1	ACOUSTIC CEILING BAFFLE	098436	MFR: TURF STYLE: Drop, Large COLOR: 04 Light Grey;
BALE-1	LOW HEADROOM CARDBOARD BALER	EQUIPME	LOW-PROFILE VERTICAL BALER BASIS OF DESIGN: MANUF: BRAMIDAN MODEL: X25 FINISH: SUBMIT MANUF'S STANDARD COLOR CHART FOR SELECTION DIMENSIONS: 69"W X 50" D X 79"H BALE SIZE: 48" W X 30"D X 30" H POWER: 208/230/480V 3-PHASE
BIN-1	WASTE COLLECTION CART	EQUIPME	OWNER PROVIDED EQUIPMENT BASIS OF DESIGN MFR: GLOBAL INDUSTRIAL STYLE: DELUXE GRAY PLASTIC TILT TRUCK CAPACITY: 1/2 CUBIC YARD - 750LB SIZE: 46"L X 31" W X 33" H COLOR: GRAY
BIN-2	RECYLCING COLLECTION CART	EQUIPME	OWNER PROVIDED EQUIPMENT BASIS OF DESIGN MFR: GLOBAL INDUSTRIAL STYLE: DELUXE BLUE PLASTIC RECYCLING TILT TRUCK CAPACITY: 1/2 CUBIC YARD - 750LB SIZE: 46"L X 31" W X 33" H COLOR: BLUE
BOLL-1	LIFT-1 MANUF'S BUMPER POST	111319	MFR: Type info here and keep semicolon at end STYLE: Type info here and keep semicolon at end COLOR: Type info here and keep semicolon at end;
BOLL-2	STEEL BOLLARD WITH CONCRETE FILL	055000	SIZE: 8IN DIAMETER MATERIAL: STEEL WITH CONCRETE INFILL INSTALL: EMBEDDED;
BOLT-1	HEAVY-DUTY CANE BOLT **8595**	050520	MFR: ABBEY TRADING MODEL: ABB-520-300-GARAGEBOLT SIZE: 12-1/2" MATERIAL: STEEL FINISH: BLACK ACCESSORY: GROUND PLATE;
BRKT-1	WALL BRACKET	064023	MFR:MOCKETT MODEL: SWS4B - 21" MEDIUM BASIC WORK SURFACE SUPPORT FINISH:GREY (92) ;
CMU-1	CONCRETE MASONRY UNIT	042000	CONCRETE MASONRY UNIT IN SIZES AND CONFIGURATION AS INDICATED ON DRAWINGS. REFERENCE SPECIFICATIONS
CMU-2A	GLAZED BLOCK (CMU)	042000	MFR: Spectra Glaze PRODUCT: 4" GLAZED BLOCK - SINGLE SIDE MODEL: 4S COLOR: LT Olive NOMINAL SIZE: 4"W X 8"H X 16"L
CMU-2B	GLAZED BLOCK COVED BASE (CMU)	042000	MFR: Spectra Glaze PRODUCT 4" GLAZED BLOCK - SINGLE SIDED WITH COVE BASE MODEL: 4G COLOR: LT Olive NOMINAL SIZE: 4"W X 8"H X 16"L
CMU-2C	GLAZED BLOCK COVED BASE CAP (CMU)	042000	MFR: Spectra Glaze PRODUCT 4" GLAZED BLOCK - SINGLE SIDED WITH COVE BASE MODEL: 1-4VGCC0 COLOR: LT Olive NOMINAL SIZE: 1"W X 16"H X 4"L
CMU-2D	GLAZED BLOCK EDGE CAP (CMU)	042000	MFR: Spectra Glaze PRODUCT 4" GLAZED BLOCK - SINGLE SIDED WITH COVE BASE MODEL: 1-4CCO COLOR: LT Olive NOMINAL SIZE: 1"W X 16"H X 4"L
CMU-2E	GLAZED BLOCK DOUBLE SIDED (CMU)	042000	MFR: Spectra Glaze PRODUCT 4" GLAZED BLOCK - SINGLE SIDED WITH COVE BASE MODEL: 4ST COLOR: DP Olive NOMINAL SIZE: 8"W X 16"H X 4"L
CMU-3	CONCRETE MASONRY UNIT (CMU) - SOLID	042000	SOLID CONCRETE MASONRY UNIT IN SIZES AND CONFIGURATIONS AS SHOWN IN DRAWINGS. REFER TO SPECIFICATIONS
CNPY-1	CANOPY	084413	MFR: CWALL-1 MFR COLOR: BLACK ANODIZED TO MATCH CURTAINWALL DEPTH: 30 INCHES SIZING: PER DETAILS DELEGATED DESIGN BY INSTALLER/MFR;
COAT-1A	ARCHITECTURAL COATING	072419	MFR: DRYVIT STYLE: DEMANDIT SANDED APPLICATION: SPRAY OR BRUSH APPLIED COLOR RGB: 208,210,208 COLOR RAL: 7047;

ID	Short Name	Section	Spec Data
COAT-1B	ARCHITECTURAL COATING	072419	MFR: DRYVIT STYLE: DEMANDIT SANDED APPLICATION: SPRAY OR BRUSH APPLIED COLOR RGB:76,78,77 COLOR RAL: 7043;
COAT-2	ELASTOMERIC ARCHITECTURAL COATING AND RESTORATION	099653	MFR: DRYVIT STYLE: WEATHERLASTIC - SANDPEBBLE APPLICATION: TROWEL-APPLIED COLOR: WHITE;
COIL-1	OVERHEAD COILING DOOR	083323	MFR: RAYNOR STYLE: DURACOIL SLATS: FLAT (FF) FINISH: ARMOR BRITE POWDERCOAT, COLOR TBD;
COIL-2	OVERHEAD COILING SHUTTER	083313	MFR: RAYNOR STYLE: DURASHUTTER MODEL: CP CONSTRUCTION: 22 GA STEEL, FLAT PROFILE, SLIP-IN COLOR: TBD SECURITY: LOCKABLE OPERATION: CRANK;
COIL-3	OVERHEAD COILING GRILLE	08 33 26	MFR: RAYNOR STYLE: DURAGRILLE SECURITY: SLIDE BOLT LOCK, LOCKABLE FROM INTERIOR OPERATION: MANUAL FINISH: CLEAR ANODIZED MOUNT: FACEMOUNT GRILLE PATTERN: GSA STRAIGHT PATTERN;
CONC-1	SEALED CAST IN PLACE CONCRETE	096723 / 0	NEW CAST IN PLACE CONCRETE WITH FINISHES AS INDICATED ON DRAWINGS - REFER TO SPECIFICATIONS
CONC-2	POLISHED CONCRETE	033543	EXISTING CONCRETE SLABS WITH VARIOUS NEW FINISHES AS DESCRIBED IN DRAWINGS. REFERENCE SPECIFICATIONS
CORK-1	TACKABLE WALL PANEL	101100	MFR: FORBO PRODUCT: BULLETIN BOARD COLOR: BLACK OLIVE CONTENT: cork, linseed oil, jute THICKNESS: 6.0 mm ROLL DIMENSIONS: 1.22 m X ≤ 28 m RECYCLED CONTENT: 43%
CPT-1	WALK OFF CARPET TILE	096813	MFR: MOHAWK STYLE:First Step II, GT315/QL315 COLOR: 989 OBSIDIAN;
CPT-2	CARPET TILE	096813	MFR: Interface STYLE:Step It Up INSTALL: Ashlar COLOR: 106335 Coal;
CT-1	CERAMIC WALL TILE	093013	MFR: Nemo STYLE: Seta COLOR: 10 Olivia SIZE: 1/2"x1/2";
CT-2	CERAMIC WALL TILE	093013	MFR: Fireclay Tile STYLE: Picket SIZE: 9-13/16" x 3-3/4" COLOR: Spruce Gloss (V3) BODY: Recycled Clay INSTALL PATTERN: Braid;
CWALL-1	GLAZED ALUMINUM CURTAIN WALL SYSTEM	084413	MFR: KAWNEER ALUMINUM CURTAINWALL SYSTEM MODEL: 1600 WALL SYSTEM 1 COLOR: BLACK ANODIZED
DM-1	DRAINAGE MAT	071416	MFR: HENRY CO PRODUCT: DB 200;
DUMP-1	SELF COMPACTING DUMPSTER	EQUIPME	OWNER PROVIDED EQUIPMENT;
EIFS-1	EXTERIOR INSULATION AND FINISH SYSTEMS	072419	MFR: DRYVIT REINFORCING MESH: PANZER MEZH 20 oz. WEATHER BARRIER: BACKSTOP NT-VB SPRAY BASE COAT: DRYFLEX TOP COAT: DEMANDIT COLOR: PER ELEVATIONS;
EIFS-2	EXTERIOR INSULATION AND FINISH SYSTEMS **8595**	072419	MFR: DRYVIT STYLE: NONCEMENTICIOUS BASE COAT (NCB) COLOR: PER ELEVATIONS TEXTURE: FREESTYLE;
ELEV-1	PUBLIC / SERVICE ELEVATOR	142400	MFR: THYSSENKRUPP MODEL: ENDURA MRL STYLE: TWINPOST, ABOVE GROUND, 1-STAGE SPEED: 80 FPM CAPACITY: 5,000 LB OPENINGS: FRONT & REAR ALIGNED DOOR TYPE: 4'-6" TWO-SPEED, RH, LH WALL/ENTRY FINISH: #4 BRUSHED STAINLESS STEEL CEILING: METAL PAN DOWNLIGHT ACCESSORY: 2" FLAT BAR HANDRAIL;
EPDM-1	EPDM ROOF MEMBRANE	075323	MATCH EXISTING MANUF: FIRESTONE STYLE: 60 MIL EPDM COLOR:WHITE;
EPOXY-1	RESINOUS FLOORING	096723	MFR: SHERWIN WILLIAMS MODEL: RESUFLOR MPE, PT & RESUTILE HTS 100 (SATIN) COLOR: TO MATCH EXISTING EPOXY FLOORING;"
FEC-1	FIRE EXTINGUISHER CABINET - SURFACE MOUNTED	104416	MFR: PRODUCT: SURFACE-MOUNTED FIRE EXTINGUISHER CABINET MATERIALS: STEEL;
FEC-2	FIRE EXTINGUISHER CABINET - SEMI RECESSED	104416	MFR: PRODUCT: SEMI-RECESSED FIRE EXTINGUISHER CABINET MATERIALS: STEEL;
FENCE-1	METAL FENCES AND GATES	323119	MANF: AMETCO PRODUCT: EAGLE DESIGN GALVANIZED METAL FENCE TOP STYLE: STRAIGHT TOP PICKET HEIGHT: 8'-0" COLOR: BLACK GATES: DOUBLE CANILEVER, SINGLE CANTILEVER, AND SINGLE SWING, MANUAL OPERATION;
FENCE-2	CHAIN LINK FENCE AND GATES	323113	MFR: AMERICAN FENCE CO PRODUCT: VINYL-COATED CHAIN LINK FENCE HEIGHT: 8'-0" COLOR: BLACK ACCESSORIES: BLACK PRIVACY SLATS THROUGHOUT, BLACK COVER CAPS GATES: DOUBLE & SINGLE CANTILEVER, MANUAL OPERATION, PRIVACY SLATS;
FILM-1	PVC-FREE VINYL FILM	085313	PRODUCT:ALUMIGRAPHICS SMOOTH APPLICATION: VERTICAL COLOR: WHITE TYPE: ALUMINUM FOIL BASE MEDIA LOCATIONS: ON GLASS AS INDICATED IN DRAWINGS;

ID	Short Name	Section	Spec Data
FLASH-1	ALUMINUM BRAKE FRAMED FLASHING - PREFINISHED	076200	
FLASH-2A	GALVANIZED STEEL BRAKE FORMED FLASHING. PREFINISHED	076200	
FLASH-2B	GALVANIZED STEEL BRAKE FORMED SHEET. PREFINISHED	076200	COLOR: TO MATCH CWALL-1 ALUM FRAME;
GL-1	1" INSULATED GLASS UNIT	088000	MRF: OLDCASTLE STYLE: SOLARBAN 60 COLOR: CLEAR + CLEAR SPACER COLOR: BLACK;
GL-2	1" INSULATED GLASS UNIT WITH TEMPERED LITE	088000	MRF: OLDCASTLE STYLE: SOLARBAN 60 COLOR: CLEAR + CLEAR SPACER COLOR: BLACK TEMPERED: YES, BOTH LITES
GL-3	1" INSULATED GLASS UNIT LAMINATED AND TEMPERED	088000	MRF: OLDCASTLE STYLE: SOLARBAN 60 STARPHIRE COLOR: CLEAR + CLEAR SPACER COLOR: BLACK TEMPERED: BOTH LITES
GL-4	1/4" CLEAR FULLY TEMPERED GLASS	088000	MONOLITHIC GLASS IN THICKNESSES AS REQ'D FOR CONFIGURATIONS SHOWN IN DRAWINGS. REFER TO SPECIFICATIONS
GUARD-1	WALL MOUNTED STAINLESS STEEL CRASH RAIL	102600	MRF: WALLGAURD.COM STYLE: PROTECTOR SERIES 2182 COLOR: STAINLESS STEEL SIZE: 1 1/2" X 5 1/2" NOTES: PROVIDE MANUFACTURERES STANDARD WALL BRACKETS AND FINISH CAPS
GUARD-2	FLOOR MOUNTED STAINLESS STEEL CRASH RAIL	102600	MRF: ALVARADO MFG STYLE: CB BUMPER SYSTEM COLOR: STAINLESS STEEL;
GUARD-3	CORNER GUARD	102600	MRF:Koffler Sales Company STYLE: Stainless Steel Corner Guard, A674 COLOR: Stainless Steel;
GUARD-4	CORNER GUARD	102600	MRF:Alpar STYLE: Flush Mount Biobased Polymer End Wall MODEL: CG-888B COLOR: 301 Linen White;
GWB-1	GYPSUM WALL BOARD - 5/8" TYP.	092900	GYPSUM WALL BOARD, 5/8" UNLESS NOTED OTHERWISE
GWB-2	GYPSUM WALL BOARD - TYPE 'X' - 5/8"	092900	GYPSUM WALL BOARD, 5/8" UNLESS NOTED OTHERWISE
GWB-3	1/2" CEMENT BOARD	092900	1/2" CEMENT BOARD
HATCH-1	ROOFTOP HATCH	077200	MFR: BABCOCK DAVIS STYLE: PERSONEL II ROOF HATCH MODEL: BA3054;
HINGE-1	CONTINUOUS STEEL HINGE	050500	MFR: MONROE PMP PRODUCT: HEAVY DUTY CONTINUOUS HINGE, NO HOLES MATERIAL: STEEL LENGTH: 84";
INSUL-1	FIBERGLASS BATT INSULATION	072100	MANUF: OWENS CORNING PRODUCT: ECOTOUCH UNFACED FIBERGLASS BATT INSULATION;
INSUL-2	EXTRUDED POLYSTYRENE BOARD INSULATION	072100	MFR: DOW CHEMICAL THICNKESS: AS DESCRIBED IN DRAWINGS TYPE: TYPE IV, 25 PSI FOR EXTERIOR WALL CAVITY
INSUL-3A	POLYISOCYANCURATE FINISHED BOARD INSULATION	072100	MFR: DOW CHEMICAL PRODUCT: THERMAX HEAVY DUTY PLUS THICKNESS: 2" FACING: 16.5 MIL EMBOSED ALUMINUM / 1 MIL EMBOSED ALUMINUM INSTALLTION: INSTALL WITH 16.5 MIL SIDE AS FINISH FACE COLOR: WHITE TRIM: MANUF'S STANDARD J TRIM AT MATERIAL TERMINATION, MANUF'S STANDARD INTERLOCKING SYSTEM AT PANEL JOINTS.
INSUL-3B	PLYWOOD FACED INSULATED PANEL	072100	BASIS OF DESIGN MFR: HUNTER PANELSL PRODUCT: Xci PLY THICKNESS: 2.7" R-VALUE: 13.1 INSTALLATION: OVER CMU SUBSTRATE - PROVIDE OWNER'S STANDARD FASTENERS AND FASTEN PER STANDARD INSTALLATION INSTRUCTIONS FOR CMU SUBSTRATE
INSUL-4	POLISOCYANURATE BOARD INSULATION	075323	MFR: FIRESTONE MODEL: ISO 95+ GL COMPRESSIVE STRENGTH: 20 PSI MINIMUM REINFORCING: BLACK GLASS REINFORCED MAT LAMINATED R-VALUE: R-30 MINIMUM
INSUL-5	E**8595**V GRADE EXTRUDED POLYSTYRENE BOARD INSULATION	072100	MFR: DOW CHEMICAL THICNKESS: AS DESCRIBED IN DRAWINGS TYPE: TYPE VII, 60 PSI MIN. FOR USE BELOW GRADE
INSUL-6	STONE WOOL FIRESTOPPING	072100	
INSUL-7	INSULATING FOAM SEALANT	072100	
INSUL-8	SEMI-RIGID STONE WOOL INSULATION	072100	R-VALUE: 4.3/INCH THICKNESS: AS REQ'D PER DRAWINGS FIRE PERFORMANCE: ASTM E 136 MOISTURE RESISTANCE: ASTM C 1104, .05% WATER VAPOR PERM: ASTM E96 COMPRESSIVE RESISTANCE: ASTM C 165;
JOINT-1	MILLWORK TRIM ANGLE	092900	MFR: FRY REGLEY OR APPROVED EQUAL ALTERNATE STYLE: MWRL100 COLOR: BLACK;
JOINT-2	DRYWALL SLIP JOINT	092900	MFR: CLARK DIETRICH OR APPROVED EQUAL ALTERNATE STYLE: 1/2" REVEAL DRYWALL SLIP JOINT PRODUCT: 4058-50 COLOR: PAINT TO MATCH WALL FINISH;
JOINT-3	DRYWALL CHANNEL REVEAL BEAD	092900	MFR: FRY REGLEY OR APPROVED EQUAL ALTERNATE STYLE: MWRL100 COLOR: BLACK;
JOINT-4	DRYWAL Z REVEAL BEAD	092900	MFR: FRY REGLEY OR APPROVED EQUAL ALTERNATE STYLE: MWRL100 COLOR: BLACK;
LIFT-1	PIT RECESSED SCISSOR LIFT	111319	MFR: KELLEY PRODUCT: HULK SERIES KDL DOCK LIFT MODEL: KDL68-6 CAPACITY: 6,000 LB COLOR: BLACK
LINO-1	LINOLEUM - MILLWORK	064120	MFR: Forbo STYLE: Furniture Linoleum COLOR: 4184 Olive;
LOCK-1A	OWNER PROVIDED VENDOR PERSONAL ITEMS LOCKER	EQUIPME	MFR: Foreman STYLE: PHENOLIC Z-TIER US-STYLE LOCKER WITH BENCH COLOR: Black LOCK: Foreman Hasp SIZE: 12"x12"x60" NOTE: With coordinating sloped top attachment, typ;

ID	Short Name	Section	Spec Data
LOCK-1B	VENDOR PERSONAL ITEMS LOCKER	EQUIPME	MFR: Foreman STYLE: PHENOLIC Z-TIER US-STYLE LOCKER COLOR: Black LOCK: Foreman Hasp SIZE: 12"x12"x60" NOTE: With coordinating sloped top attachment, typ;
LOUV-1	ARCHITECTURAL EXTERIOR LOUVER	089100	MFR: RUSKIN TYPE: DRAINABLE BLADES WITH HEAVY CHANNEL FRAME AND BIRD SCREEN FINISH: 2 COAT 70% PDVF OR EQUAL MOUNTING: FURNISH WITH EXTERIOR FLAT FLANGE FOR INSTALLATION. FREE AREA: PER MECHANICAL ENGINEER'S REQMTS SIZE: REFER TO DRAWINGS COLOR: TBD BY ARCHITECT TO MATCH ADJACENT EXTERIOR FINISH;
MA-1A	WASTE BASKET WITH DOLLY	064100	MFR: Rubbermaid STYLE:VENTED SLIM JIM® 23 GA, SKU: FG354060BLA DOLLY: SLIM JIM® RESIN TRAINABLE DOLLY,SKU: 1980602 COLOR: Black;
MA-1B	WASTE BASKET W/O DOLLY	064100	MFR: Rubbermaid STYLE:VENTED SLIM JIM® 23 GA, SKU: FG354060BLA COLOR: Black;
MA-2	PULL HANDLE	064100	MFR: Richelieu STYLE:Contemporary Metal Pull 2288 PRODUCT: BP228804900 COLOR: Matte Black;
MA-3	SHELF STANDARD	064100	MANUF: Knape and Vogt PRODUCT:82/182 Series, Slotted Shelving Standard, Wall Mounted, 82BP BLK 63 COLOR: Black;
MA-4	SHELF STANDARD BRACKET	064100	MANUF: Knape & Vogt PRODUCT: 82/182 Series, Bracket,182BP BLK 12.5 COLOR: Black NOTE: Holds 450 lbs with anti-dislodge safety features.
MA-6	HEAVY DUTY LOCKING CASTER	064100	MANF: McMaster-Carr PRODUCT: Leveling Caster with Nonmarking Black Nylon Wheel DESCRIPTION: 2-1/2" Diameter, Thumbweel Adjustment, Black Aluminum Frame;
MA-7	RESETTABLE COMBINATION CAM LOCK	064100	MANF: McMaster-Carr PRODUCT: Resettable Combination Cam Lock DESCRIPTION:Black Painted Zinc, for 3/8" Maximum Thicknessl;
MA-8	PULL HANDLE	064100	MANF: Richelieu PRODUCT: DP46LBL DESCRIPTION: Black NOTE: Can be cut to required length and must be installed using wood screws (not included). No grooves needed;
MA-9	FLATWARE CYLINDER	064100	MANF: Browne PRODUCT: Stainless Steel Flateware Cylinder DESCRIPTION: 80113, Plain SIZE: 3.8" dia x 5.5"H
MA-10	FALSE TOE BASE	064100	MANF: Richelieu PRODUCT: Quick Toe DESCRIPTION: 363030 FINISH: White, finish over with RB-1;
MA-11	WASTE BASKET SMALL	064100	MANF: Rubbermaid PRODUCT: FGLH12 LIDNER: FGLH12 Square Rigid Plastic Liner;
MA-12	GLIDE HARDWARE WITH WASTE BINS	064100	MANF: Knape and Vogt SERIES: PDMTM PRODUCT: PDMTM15-2-35WH ACCESSORY: Include (2) QT35PB-WH Waste Bins;
MA-13	ADA SHROUD	064100	MANUF: RAKKS PRODUCT: CUSTOM, ADA COMPLIANT ALUMINUM VANITY BRACKET SIZE: CUSTOM, SEE MILLWORK SECTION FINISH: CUSTOM, SEE MILLWORK ELEVATIONS;
MAIL-1	CLUSTER MAILBOX	105500	MFR: Florence Mailboxes STYLE: 4C compliant Cluster Mailbox PRODUCT: 4C14D-16 COLOR: White INSTALLATION: Recessed DOORS: 16 Tenant, 2 Parcel Lockers
MAIL-2	CLUSTER PARCEL MAILBOX **8595**	105500	MFR: Florence Mailboxes STYLE: 4C compliant Cluster Mailbox Parcel Box PRODUCT:4C14S-2P COLOR: White INSTALLATION: Recessed DOORS: 2 Parcel Lockers
MICRO-1	OWNER PROVIDED MICROWAVE	EQUIPME	MFR: GE STYLE: COUNTER TOP MICROWAVE SKU: JES1145SHSS NOTE: STAINLESS STEEL;
MTLPNL-1	PERFORATED METAL PANEL	057500	MFR: McNICHOLS MODEL: PERFORATED METAL SQUARE PATTERN: 5/16" SQUARE ON 1/2" CENTER: 39% OPEN MODEL No: 16961218 MATERIAL: CARBON STEEL GAUGE: 18 FINSH: PT-7 PROVIDE MANUF'S STANDARD PANEL TRIM, FASTENERS AND ACCESSORIES AS PER DRAWINGS;
MTLPNL-2	WELDED WIRE MESH RAILING INFILL	057300	MFR: McNICHOLS AR APPROVED EQUAL ALTERNATE PRODUCT: PREFABRICATE RAILING INFILL PANEL MODEL: PROVIDE RAKE, TRANSITION, AND RECTANGULAR PANELS WITH INFILL PRECUT AND ASSEMBLED WITH FRAME AS PER DRAWINGS INFILL PATTERN: SQUARE 2" X 2" WELDED WIRE MESH FRAME: SEE DRAWINGS MODEL No: 36B2135048 MATERIAL: CARBON STEEL GAGE: 10 GA WIRE (.135") FINSH: PREFINISHED CUSTOM POWDERCOAT TO MATCH COLOR PT-B;
MTLPNL-3	CORRUGATED DECK ROOFING	74113.13	SIZING: STANDARD 1-1/2" DEPTH SIDELAP: OVERLAPPING FOR DRAINAGE;
MTLPNL-4	FLAT LOCK PANEL SYSTEM	076419	MFR:AMERICLAD MODEL: AC-5000 SIZING: FINISH: BLACK ANODIZED, TO MATCH CURTAINWALL;
MTLPNL-5	PERFORATED METAL PANEL	057500	MFR: McNICHOLS MODEL: LATTICE 1253 PATTERN: 1/2" SQUARE ON 11/16" CENTER: 53% OPEN MODEL NO: 16870012M7 GAUGE: 12 FINISH: GALVANIZED AND SITE PAINTED;
OVHD-1	OVERHEAD DOOR	083613	MFR: RAYNOR STYLE: ALUMAVIEW AV200 COLOR: BLACK ANODIZED FINISH;
OVHD-2	OVERHEAD DOOR	083613	MFR: RAYNOR STYLE: THERMASEAL TM220 COLOR: BLACK TO MATCH BLACK ANODIZED CW FRAME TRACK: LOW HEAD ROOM;

ID	Short Name	Section	Spec Data
PEG-1	METAL PEG BOARD	093013	MFR: Diamond Life STYLE:Pegboard MX, Metal, Cusotm Size SIZE: Custom size, see elevation EDGE: Finished flange by manufacturer COLOR: Black MOUNT: With Backing Board ACCESSORIES: ;
PEG-2	METAL PEG BOARD	093013	MFR: Diamond Life STYLE:Pegboard MX, Metal SIZE: 48"x70" EDGE: Finished flange by manufacturer COLOR: Black MOUNT: With Backing Board ACCESSORIES: ;
PNL-1A	WALL PROTECTION PANEL	099123	MFR: Alpar STYLE: Sheet Wall Protection, Models WB-40 CONTENT: Biobased, PVC-free Polymer sheet COLOR: 301 Linen White;
PT-1_	ACRYLIC LATEX PAINT, FLAT	099123	MFR: Benjamin Moore STYLE: ULTRA SPEC® 500 INTERIOR EGGSHELL FINISH N538 ;
PT-2A	ACRYLIC LATEX PAINT, EGGSHELL (WHITE)	099123	MFR: Benjamin Moore STYLE: 2121-70 COLOR: Chantilly Lace;
PT-3A	INT SCRUBBABLE PAINT-WHITE	099113	MFR: Scuffmaster PRODUCT: ScrubTough Max COLOR: To Match PT-2A;
PT-4_	TRAFFIC STRIPING FLOOR PAINT	099123	MFR: RUST-OLEUM STYLE:2300 System Traffic Zone Striping Paint;
PT-5A	INTERIOR METAL PAINT-WHITE	099123	MFR:Benjamin Moore STYLE: Superspec HP DTM Acrylic Semi-Gloss P29 STYLE: 2121-70 COLOR: Chantilly Lace;
PT-6_	EXTERIOR PAINT - STEEL	099113	MFR: SHERWIN WILLIAMS PRODUCT: MACROPOXY 646 MIDCOAT AND PIGMENTED ACROLON 100 TOPCOAT;
PT-6B	EXTERIOR PAINT - STEEL	099113	MFR: SHERWIN WILLIAMS PRODUCT: MACROPOXY 646 MIDCOAT AND PIGMENTED ACROLON 100 TOPCOAT COLOR: TRAFFIC GRAY B, RAL 7043;
PT-_A	PAINT COLOR - EXISTING WHITE	099123	MFR: Benjamin Moore STYLE: 2121-70 COLOR: Chantilly Lace;
PT-_B	PAINT COLOR - GREY	099123	MFR: Benjamin Moore STYLE:1617 COLOR: Cheating Heart;
PT-_C	PAINT COLOR - MATCH COAT-1A	099113	COLOR: MATCH COAT-1A;
PT-_D	PAINT COLOR - MATCH COAT-1B	099113	COLOR: RAL 7043;
RAIL-1	CANE RAIL	057300	CANE DETECTION RAIL FABRICATED FROM STANARD STEEL SHAPES MATERIAL: CARBON STEEL RAIL: 3/4" X 3" BAR. ALL JOINTS FULLY WELDED AND GROUND SMOOTH POSTS AND BASES: 3/4" X 1 1/2" BAR FINISH: PT-7
RAIL-2	STEEL GUARDRAIL w MTPNL-2 INFILL	057300	FABRICATED STEEL HANDRAIL w/ INFILL PANEL CONFIGURED AS PER DRAWINGS MATERIAL: CARBON STEEL PICKET: CARBON STEEL BAR STOCK 3/4" X 2 1/2" TOP AND BASE FULLY WELDED AND GROUND SMOOTH - PROVIDE FASTENING TABS FOR INFILL PANEL TOP RAIL: CARBON STEEL BAR STOCK 3/4" X 3" - ALL JOINST FULLY WELDED AND GROUND SMOOTH PICKET SPACING: 4' O.C. OR AS NOTED ON DRAWINGS INFILL PANEL: MTLPNL-2 FINISH: PT-5B;
RAIL-3	TUBE HANDRAIL	055213	PRODUCT: 1 1/2" DIA SCHED 80 STEEL HANDRAIL CONFIGURATION: AS INDICATED ON DRAWINGS, PROVIDE IN CONFIGURED AND WITH BRACKETS AS REQ'D CONSTRUCTION: RETURN ENDS TO GUARDRAILS AS INDICATED ON DRAWINGS. ALL JOINTS AND CONNECTIONS TO BE FULLY WELDED - GRIND WELDS SMOOTH
RAIL-4	PAINTED STEEL SAFETY RAIL **8595**	055213	MANUF: WIRE CRAFTERS PRODUCT: INDUSTRIAL SAFETY HANDRAIL CONFIGURATION: 42" HIGH WITH 2 INTERMEDIATE HORIZONTAL RAILS PROFILE: SQUARE TUBE COLOR: BLACK KICKPLATE: 4" HIGH;
RB-1	RUBBER WALL BASE	096513	MFR: Johnsoninte STYLE: Rubber Wall Base 4" COLOR: Burnt Umber;
REF-1	OWNER PROVIDED UNDER COUNTER FRIDGE	EQUIPME	MFR: Summit Appliances STYLE:24" Wide Built-In All-Refrigerator, ADA Compliant SKU: FF7LBLBISSTBADA NOTE: Locking Door;
REF-2	OWNER PROVIDED REFRIGERATOR	EQUIPME	MFR: GE STYLE:SIDE BY SIDE REFRIGERATOR SKU: GSS25GSHSS NOTE: STAINLESS STEEL;
ROOF-1	EPDM ROOF	075323	SEE G002 TYPES AND SYSTEMS
SCRN-1	ROOFTOP EQUIPMENT SCREEN	108200	MFR: INDUSTRIAL LOUVERS INC PRODUCT: 1625XPI SYSTEM SIZE: 1-5/8 IN FINISH: FLUROPON PURE 2-COAT COLOR: TBD;
SHELF-1	OWNER PROVIDED VENDOR STORAGE	EQUIPME	MFR: ULINE STYLE: Stainless Steel Wire Shelving Unit - 60 x 24 x 86" MODEL: H-6154;
SHELF-2	OWNER PROVIDED VENDOR STORAGE	EQUIPME	MFR: ULINE STYLE: Stainless Steel Wire Shelving Unit - 48 x 24 x 86" MODEL: H-6153;
SHELF-3	OWNER PROVIDED VENDOR STORAGE	EQUIPME	MFR: ULINE STYLE: Stainless Steel Wire Shelving Unit - 36 x 18 x 86" MODEL: H-6148;
SHELF-4	OWNER PROVIDED VENDOR STORAGE	EQUIPME	MFR: ULINE STYLE: Stainless Steel Wire Shelving Unit - 60 x 24 x 72” MODEL: H-4298;
SHELF-5	OWNER PROVIDED VENDOR STORAGE	EQUIPME	MFR: ULINE STYLE: Stainless Steel Wire Shelving Unit - 36 x 18 x 72" MODEL: H-5479 ;
SHTG-1	EXTERIOR GYPSUM SHEATING	061643/07	GLASS MAT GYPSUM SHEATHING MANUF: GEORGIA-PACIFIC;
SHTG-2	EXTERIOR GRADE PRESSURE TREATED PLYWOOD	061600	EXTERIOR STRUCTURAL PLYWOOD SHEATHING
SKY-1	SKYLIGHT	086100	MFR: VELLUX MODEL: RIDGELIGHT 20-40 SIZE GRID: 1000 X 2200, FIXED GLAZING: LOW E DOUBLE GLAZE;

ID	Short Name	Section	Spec Data
SL-1	CONCRETE FLOOR PATCH/SEALER	096723	MFR: TENNANT MODEL: ECO-HF 250 ECO-FPE;
SLNT-1	ACOUSTICAL JOINT SEALANT	079219	QUALITIES: NON-SAG, GUN GRADE, NON-FLAMMABLE, LATEX-BASED, REMAINS FLEXIBLE;
SLNT-2	INTERIOR JOINT SEALANT	079200	QUALITIES: ONE-PAR, MILDEW-RESISTANT SILICONE SEALANT COLOR: CLEAR;
SLNT-3	EXTERIOR JOINT SEALANT	079200	QUALITIES: ONE-PART, LOW MODULUS SILICONE SEALANT COLOR: TBD BY ARCHITECT TO MATCH ADJACENT SURFACES;
SPAC-1	SPRAY APPLIED ACOUSTIC CEILING FINISH	072129	MANUF: INTERNATIONAL CELLULOSE CORPORATION PRODUCT: K-13 COLOR: MATCH EXISTING CEILING;
SSF-1	QUARTZ SOLID SURFACE	123661	MFR: Silestone by Cosentino COLOR: N-Boost Marengo FINISH: Polished;
SSTL-1	STAINLESS STEEL COUNTERTOP	123616	DEPTH: 3/4" DIMENSIONS: PER DRAWINGS EDGE: EASED;
STAIR-1	FABRICATED STEEL STAIR ASSEMBLY	055113	ASSEMBLED STEEL STAIR AS SHOWN IN DRAWINGS
STAIR-2	SHIP LADDER	055000	STEEL SHIPS LADDER AS SHOWN IN DRAWINGS
STFT-1	INTERIOR ALUMINUM STOREFRONT - CENTER GLAZED	084113	MFR: Kawneer (Basis of Design) SYSTEM: TRIFAB 451 SIGHTLINE: 2 3/4" WIDTH, 4 1/2" DEPTH GLAZING: INSIDE GLAZED GLAZING LOCATION: CENTER INFILL: 1/4" GL-4, OR 1" IGU (GL-1) BY LOCATION FINISH: BLACK ANNODIZED;
STFT-2	EXTERIOR ALUMINUM STOREFRONT	084113	MFR: KAWNEER SYSTEM: TRIFAB VERSAGLAZE 451T SIGHTLINE: 2 IN WIDTH, 4.5" DEPTH FINISH: BLACK ANNODIZED;
STFT-3	INTERIOR ALUMINUM STOREFRONT - CENTER GLAZED	084113	MFR: Kawneer (Basis of Design) SYSTEM: TRIFAB 601 SIGHTLINE: 2 3/4" WIDTH, 6" DEPTH GLAZING: INSIDE GLAZED GLAZING LOCATION: CENTER INFILL: 1/4" GL-4, OR 1" IGU (GL-1) BY LOCATION FINISH: BLACK ANNODIZED;
STRUT-1A	UNISTRUT CHANNEL	054500	MFR: UNISTRUT MODEL: SOLID CHANNEL MATERIAL: PLAIN CARBON STEEL STYLE: P5500 1 5/8" X 2 7/16" FINISH: PAINTED PT-5B
STRUT-1B	UNISTRUT CHANNEL	054500	MFR: UNISTRUT MODEL: BACK-TO-BACK SOLID CHANNEL MATERIAL: PLAIN CARBON STEEL STYLE: P1001 1 5/8" X 3 1/4" FINISH: PAINTED PT-5B
STRUT-1C	UNISTRUT CHANNEL	054500	MFR: UNISTRUT MODEL: DOUBLE COMBINATION CHANNEL MATERIAL: PLAIN CARBON STEEL STYLE: P1001C 1 5/8" X 3 1/4" FINISH: PAINTED PT-5B
STRUT-2A	STUT-1 MANUF'S FLAT PLATE FITTING	054500	MFR: UNISTRUT MODEL: 3- HOLF FLAT PLATE w/ CHANNEL NUTS AS REQ'D MATERIAL: PLAIN CARBON STEEL STYLE: P1925 (PLATE) w/ MANUFS' RECOMENDED CHANNEL NUT FINISH: PAINTED PT-5B
STRUT-2B	STRUT-1 MANUF'S BEAM CLAMP	054500	MFR: UNISTRUT MODEL: BEAM CLAMP w/ CHANNEL NUT MATERIAL: PLAIN CARBON STEEL STYLE: P1379S (BEAM CLAMP) w/ MANUF'S RECOMENDED CHANNEL NUT FINISH: PAINTED PT-5B
STRUT-2C	STUT-1 MANUF'S 90 DEGREE FITTING	054500	MFR: UNISTRUT MODEL: 2- HOLE 90 DEGREE FITTING WITH CHANNEL NUTS MATERIAL: PLAIN CARBON STEEL STYLE: P1026 w/ MANUFS' RECOMENDED CHANNEL NUT FINISH: PAINTED PT-5B
STRUT-2D	STUT-1 TOP BEAM CLAMP	054500	MFR: UNISTRUT MODEL: BEAM CLAMP MATERIAL: PLAIN CARBON STEEL STYLE: P2786, SIZED PER CONNECTED CHANNEL FINISH: PAINTED PT-5B
TA-2	COMBO TOILET TISSUE DISPENSER & SANITARY NAPKIN DISPLOSAL	102800	MFR: Bobrick STYLE: B-3094 COLOR: Stainless Steel with Satin Finish NOTE: Locking displosal unit;
TA-4	TOILET TISSUE DISPENSER JUMBO-ROLL	102800	MFR: Bobrick STYLE: Single Jumbo-Roll Surface Mounted Toilet Tissue Dispenser, B-2890 COLOR: Satin-finish stainless steel;
TA-5	PAPER TOWEL (FOLDED) DISPENSER	102800	MFR: Bobrick STYLE:B-35903 TrimLineSeries™ Recessed Paper Towel Dispenser COLOR: Stainless Steel, Satin Finish;
TA-7	WASTE RECEPTACLE	102800	MFR:Simplehuman STYLE:Profile Step Can, 10L COLOR: Brushed Stainless Steel;
TA-11	LIQUID-SOAP DISPENSER	102800	MFR: DELTA STYLE: Counter Mounted COLOR: Black;
TA-12	GRAB BAR	102800	MFR: Bobrick STYLE: (4) 819441.UK 600 mm Straight Grab Bar (1) 819440.UK 450 mm Straight Grab Bar COLOR: Stainless Steel;
TA-14	SANITARY-NAPKIN DISPOSAL UNIT	102800	MFR: Bobrick STYLE: Surface Mounted Sanitary Napkin Disp, B-254 COLOR: Heavy Gauge stainless steel, satin finish;
TA-17A	MIRROR UNIT (FRAMED)	102800	MANUF: CB2 PRODUCT: INFINITY BLACK RECTANGLE MIRROR SIZE: 24"x36";
TA-17B	MIRROR UNIT (FRAMED)	102800	CUSTOM: MIRROR BACKED GLASS, CUT TO DIMENSIONS LISTEDN ON ELEVATION;
TA-19	HOOK	102800	MFR: Bobrick STYLE: Clothes Hook, B-233 COLOR: Stainless Steel, Satin Finish;
TA-24	DIAPER-CHANGING STATION	102800	MFR: Koala Kare STYLE: KB110-SSRE HORIZONTAL RECESSED MOUNTED COLOR: Stainless Steel;
TA-25	LAV SHROUD	102800	MFR: LACAVA STYLE: TRAP COVER, ITEM #RA098 COLOR: Polished Stainless Steel;
THRESH-1	ADA PLATE THRESHOLD	087200	MFR: PEMKO STYLE: ADA COMPLIANT ALUMINUM PLATE THRESHOLD PRODUCT: 18/1 10" LENGTH PER DRAWINGS COLOR: MILL ALUMINUM;
TRANS-1	TRANSITION STRIP	093013	MFR: Schluter STYLE: DILEX-AHKA COLOR: Annodized Aluminum;

ID	Short Name	Section	Spec Data
TRANS-2A	TRANSITION STRIP	093013	MFR: Schluter STYLE: JOLLY COLOR: Annodized Aluminum;
TRANS-2B	TRANSITION STRIP	093013	MFR: Schluter STYLE: JOLLY COLOR: MGS, Matte black textured color-coated aluminum;
TRANS-3	CARPET TRANSITION STRIP	096813	MFR: Futura STYLE: Pinless Clampdown COLOR: Etched Black;
TRANS-4	TRANSITION STRIP	101100	MFR: Fry Reglet STYLE: DRMB-625-400 COLOR: BLACK;
TRIM-1	DRYWALL END CAP TRIM		MFR: FRY REGLEY OR APPROVED EQUAL ALTERNATE STYLE: DMEC-7250 COLOR: PAINTED TO MATCH WALL;
TRIM-2	DRYWALL Z-TRIM REVEAL		MFR: TRIM-TEX OR APPROVED EQUAL ALTERNATE STYLE: MUD-IN REVEAL, Z PROFILE PRODUCT: 5810T DIMENSIONS: 5/8" DRYWALL, 1/2" REVEAL COLOR: PAINTED TO MATCH WALL;
TV-1	OWNER PROVIDED MONITOR (TELEVISION)	EQUIPME	
TV-2	OWNER PROVIDED MONITOR (TELEVISION)	EQUIPME	
VB-1	SHEET VAPOR BARRIER	061600	
WAVB-1	SELF-ADHERING SHEET AIR BARRIERS	072715	MFR: 3M PRODUCT:AIR AND VAPOR BARRIER 3015 ;
WD-1A	COLOR THRU FIBERBOARD	064120	MFR:INTERLAM PRODUCT: FORESCOLOR COLOR: BLACK THICKNESS: 18 MM FINISH: BIOSHEILD 48 Aqua Resin Floor Finish, 00 TRANSPARENT TOE KICK / WALL BASE: " 4" H X 18MM THICK, FINISH TO MATCH NOTE: THIS MATERIAL SERVES AS STRUCTURE OF MILLWORK AS WELL AS FINISH - NO PLASTIC LAMINATE OR MELAMINES TO BE USED*
WD-2	PLYWOOD	064023	PRODUCT: WI Sourced Hapton Maple Veneer over Europly THICKNESS: 18 MM FINISH: BIOSHEILD 48 Aqua Resin Floor Finish, 00 TRANSPARENT COLOR: Natural NOTE: FSC Certified;
WHEEL-1	HEAVY-DUTY, RIGID CASTER WHEEL	050520	MFR: FAIRBANKS MODEL: 152232817 SIZE: 8" CAPACITY: 1,200 LB MIN;
WIRE-1	WELDED WIRE MESH PARTITION	102213	MFR: WIRECRAFTERS PRODUCT: SECURE STORAGE CAGE SYSTEM STYLE 840 PANEL TYPE: 2" SQUARE WELDED WIRE WITH ADJUSTABLE SOLID PANEL FILL AS REQ'D FOR NON STANDARD WIDTH SECTIONS HEIGHT: 8' DOORS: SINGLE HINGE. 3'-0" STANDARD WIDTH OR AS NOTED ON DRAWINGS HARDWARE: ADA COMPLIANT HANDLE AT BOTH SIDES OF DOOR. KEYED CYLINDER STOREROOM FUNCTION LOCK;
WNDW-1	OUTSWING CASEMENT WINDOW	084413	MFR: KAWNEER, BY CWALL-1 MFR MODEL: GLASSVENT UT WINDOWS COLOR: MATCH CURTAINWALL INFILL: 1" SYSTEM DEPTH: 4-3/8" (DEEP) OPTIONS: INSECT SCREENS;
WP-1	COLD FLUID APPLIED WATERPROOFING	071416	MFR: W.R. Grace Co. - Procor APPLICATION: PREDOMINANTLY BELOW-GRADE;
WP-2	COLD FLUID APPLIED WATERPROOFING	071416	APPLICATION: BELOW GRADE, UNDER ELEVATOR PIT;
WRB-1	WEATHER RESISTANT BARRIER	072500	PRODUCT: SINGLE LAYER #15 ASPHALT FELT APPLICATION: VERTICAL TYPE: ASTM D226, TYPE 1 SLIP SHEET: ROSIN PAPER LOCATIONS: ON PLYWOOD AS INDICATED IN DRAWINGS;

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SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
   2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other work of the Contract.

C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Add Sectional Overhead Door.
   1. Base Bid: Leave in place existing Overhead Doors at East and West of South Hall (Openings marked 162B and 164), and retain all existing controls, electrical equipment and motors. Paint both sides of existing doors to match finish of new OVHD-1 doors as indicated on Drawing D201 – Demolition Elevations and as specified in Section 02 41 19 "Selective Demolition."
   2. Alternate: Demolish existing overhead doors at east and west end of South Hall and replace with new OVHD-1 doors as indicated on Drawing A201 – Building Elevations and as specified in Section 08 36 13 "Sectional Doors."

B. Alternate No. 2: Add Curtain Wall.
   1. Base Bid: Existing storefront and insulated translucent panel system running entire length of South Hall to remain as indicated on Drawing D201 – Demolition Elevations and as specified in Section 02 41 19 "Selective Demolition."
   2. Alternate: Demolish existing Storefront and Insulated Translucent Panel system back to rough masonry opening. Provide curtain wall CWAL-1 as indicated on Drawing A201 Building Elevations and as specified in Section 08 44 13 – Glazed Aluminum Curtain Walls".

C. Alternate No. 3 – Photovoltaic Array
   1. a. Base Bid: Omit Photovoltaic Array and all related work – i.e. structural modifications, roof anchors, racking, panels, electrical connections inverters, disconnects, etc.
   2. Alternate: Provide Photovoltaic Array and all related work as described in Drawings and Specifications.

END OF SECTION 01 23 00

SECTION 01 25 13
PRODUCT SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.1. SUMMARY

A. The City of Madison uses a specific list of preferred products for various specification items to establish standards of quality, utility, and appearance required.

B. The City of Madison will not allow substitutions for specified Products except as follows:

1. The Product is no longer produced or the product manufacturer is no longer in business.
2. The manufacturer has significantly changed performance data, product dimensions, or other such design criteria for the specified Product(s).
3. Products specified by naming one or more Products or manufacturer's and "or approved equal" or "approved equivalent."

C. The City of Madison will not allow substitutions for specified Products as follows:

1. For Products specified by naming only one Product and manufacturer, no substitute product will be considered.
2. For Products specified by naming several Products or manufacturers select any one of the products or manufacturers named, which complies with the specifications. No substitute product will be considered.

D. Request for substitutions from any party other than the General Contractor (GC) will not be accepted.

1.2. RELATED SPECIFICATIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 31 23 Project Management Web Site
C. Section 01 33 23 Submittals

PART 2 – PRODUCTS

2.1. SUBSTITUTION REQUEST FORM

A. During bidding all contractors (General and Sub-contractors) and suppliers of materials or products shall provide hard copy of the Substitution Request form and all required attachments directly to the Project Architect.

1. Contractors and suppliers shall use the screen shot of the form located at the end of this specification to print a hard copy for all pre-bid substitution requests.

B. After bidding only the GC shall submit a request and shall use the form located on the Project Management Web Site.

PART 3 - EXECUTION

3.1. REQUESTING A SUBSTITUTION DURING BIDDING

A. In the event that a substitution is requested during the bidding phase the Contractor or Supplier shall meet the substitution request deadline listed in the bidding documents. No substitution request will be considered during the bidding period after the stated substitution request deadline. In general this procedure shall be as follows:

1. Submit a Substitution Request Form for each different product
2. Support your request with complete data, drawings, specifications, performance data and samples as appropriate. A complete submission shall include the following:
   i. Substitution Request Form as a cover sheet
   ii Comparison of qualities of the proposed substitutions with that specified.
   iii. Changes required in other elements of the Work because of the substitution.

iv. Effect on the construction schedule.
v. Cost data comparing the proposed substitution with the Product specified.
vi. Any required license fees or royalties.
vii. Availability of maintenance service and source of replacement materials.

3. Submit the Substitution Request Form and all required supporting documentation to the City Project Manager and Project Architect.
   i. Submissions to be done as complete PDF files for each product, appropriately titled
   ii. Email submissions to the Project Architect and City Project Manager at the email addresses provided on the last page of Section D of the contract documents.
   iii. Submissions must be received by the substitution request deadline specified in Section A of the Contract Documents.

B. Substitutions submitted and approved during the bidding phase shall be announced by the City of Madison by addenda prior to the bid due date.

C. The Owner and Architect may reject any substitution request without providing specific reasons.

3.2. REQUESTING A SUBSTITUTION AFTER AWARD OF CONTRACT

A. A substitution request will only be considered after award of contract if it meets the qualifying provisions as described in 1.1.B.1 and .2 above.

B. The GC shall submit a substitution request using the digital form on the Project Management Web Site located in the Construction Administration-Substitution Request library.
   1. Click on *Add document* to open a new digital form, fill out form, provide required attachments, then click the Submit button.
   2. Consulting Staff, Owner and Owners Representatives will review the request and provide the appropriate approvals and feed back to the GC.

3.3. UNAUTHORIZED SUBSTITUTIONS

A. Any Contractor who substitutes products without proper authorization by the Owner and Architect will be required to immediately remove and replace the product and all costs required to conform to the Contract Documents shall be borne by the General Prime Contractor.

NOTE SEE NEXT PAGE FOR SAMPLE SUBSTITUTION REQUEST FORM.

1

For Pre-bid Substitution Requests all text boxes on this form are required information for a complete request.

Substitution Request

Today's Date:

Project Title:

Project Number: *Contract Number:*

By completing and submitting this form for review the General Contractor affirms that all of the following statements are correct:

1. The General Contractor affirms that this request is in compliance with the requirements described in ***Specification 01 25 13 Product Substitution Procedures.***
2. The function, appearance, and quality of the proposed substitution are equal or superior to the specified item.
3. The proposed substitution does not affect dimensions shown on the drawings.
4. The proposed substitution will have no adverse affects on other trades, the construction schedule, or any specified warranty requirements.
5. Maintenance and service parts will be locally available for the proposed substitution. (GC shall provide supporting documentation in the attachments section below.)
6. The General Contractor shall be responsible for any and all costs associated with this substitution request if approved. This includes but is not to limited to fees for building design, engineering design fees, detailing fees, plan review fees, construction costs, and inspection fees.

GC Substitution Request:

General Title:

Related Specification:

Reason for Substitution:

Proposed Substitution:
(include Name, Model, etc.)

Submitted By: *Phone:*

Company: *Email:*

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END OF SECTION

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SECTION 01 26 13
REQUEST FOR INFORMATION (RFI)

PART 1 – GENERAL

1.1. SUMMARY

A. Contractors shall use the RFI form/process to request additional information or clarification regarding the construction documents.

B. All RFI documentation will be processed through the through the Construction Administration-Request for Information Library on the Project Management Web Site (PMWS).

1.2. RELATED SPECIFICATIONS

A.	Section 01 26 46	Construction Bulletin (CB)
B.	Section 01 26 57	Change Order Request (COR)
C.	Section 01 26 63	Change Order (CO)
D.	Section 01 31 23	Project Management Web Site (PMWS)
E.	Section 01 91 00	Commissioning

1.3. PERFORMANCE REQUIREMENTS

A. RFI issues initiated by any contractor shall be done through the General Contractor (GC).
   1. RFIs submitted by any Sub-contractor under the GCs control shall be returned with no response.

B. Submit a new RFI for each issue. Only multiple questions that are of a similar nature may be combined into one RFI shall be allowed and responded to.

1.4. QUALITY ASSURANCE

A. The GC shall be responsible for all of the following:
   1. Ensure that any request for additional information is valid and the information being requested is not addressed in the construction documents.
   2. Ensure that all requests are clearly stated and the RFI form is completely filled out.
   3. Ensure that all Work associated an RFI response is carried out as intended.

B. The PA shall be responsible for the following:
   1. Ensure that all responses to contractor initiated RFIs are properly responded to in a timely fashion.
      a. The CPM, Owner, consulting staff, and other City staff shall be responsible for the initial review of the RFI. The PA shall be responsible for codifying all consultant and Owner/City staff comments into a unified RFI response.

PART 2 – PRODUCTS

2.1. REQUEST FOR INFORMATION FORM

A. The RFI form is located on the Project Management Web Site. The GC, PA, or CPM as appropriate shall click the link in the left margin of the project web site opening a new form. Project information is pre-loaded, provide additional information as indicated below in the execution to complete the form.

PART 3 - EXECUTION

3.1. CONTRACTOR INITIATED RFI

A. Immediately on discovery of the need for additional information or interpretation of the Contract Documents any contractor may initiate an RFI for additional information or clarification through the GC.

B. The GC shall select the "Submit an RFI" link on the Project Management Web Site and completely fill out the form as follows:

1. Contract related information will be automatically populated on the form.
2. Thoroughly explain the issue at hand, provide backup information (photographs, sketches, drawings, data, etc.) as necessary, and clearly state the question or problem that requires a resolution. Combine like or related issues but do not include multiple issues on one form.
    a. Example. If a duct interferes with other critical piping and electrical work include all issues into one RFI.
    b. Example. If you have a question regarding the chiller and another regarding toilet partitions create separate RFIs.
3. Check all relevant boxes for trades affected. This will assist the design team in determining who should be reviewing the RFI.

C. Upon completing the RFI click the "Submit" button. The PMWS software will automatically route the RFI to the appropriate reviewers.

3.3. RFI RESPONSES

A. Responses to simple RFI issues shall use the response section of the RFI form and shall be completed within five (5) working days of the RFI form being submitted.

B. Responses to more complex issues may require additional time or may require a Construction Bulletin to be published. The initial RFI shall be responded to within five (5) working days stating that the RFI is being reviewed and provide an estimated date for the response.

C. The following GC generated RFIs will be returned without action:

1. Requests for approval of submittals
2. Requests for approval of substitutions
3. Requests for approval of Contractor's means and methods.
4. Requests for coordination information already indicated in the Contract Documents.
5. Requests for adjustments in the Contract Time or the Contract Sum.
6. Requests for interpretation of A/E's actions on submittals.
7. Incomplete RFI or inaccurately prepared RFI.

3.4. COMMENCEMENT OF WORK RELATED TO AN RFI

A. The GC shall only proceed with the Work of an RFI when additional information is not required.

B. The GC shall not proceed with any Work associated with an RFI while it is under review.

C. The GC shall not proceed with any Work associated with an RFI that clearly states a CB will be issued in response to the RFI.

D. The GC will be required to immediately remove and replace unauthorized Work and all costs required to conform to the Contract Documents shall be borne by the GC.

END OF SECTION

SECTION 01 26 46
CONSTRUCTION BULLETIN (CB)

PART 1 – GENERAL

1.1. SUMMARY

A. Construction Bulletins (CB) are formal published construction documents that modify the original contract bid documents after construction has commenced. CBs may be published for many reasons, including but not limited to the following:
   1. Clarification of existing construction documents including specifications, plans, and details
   2. Change in product or equipment
   3. A response to a Request for Information
   4. Change in scope of the contract as either an add or a deduct of work

B. CBs provide a higher degree of detail in response to a Request for Information (RFI) through directives, revised plans/details, and specifications as necessary.

C. The CB may change the original contract documents through additions or deletions to the Work.

D. Where the directives of a CB are significant enough to warrant a Change Order Request (COR) the GC shall use all information provided in the CB to assemble all required back-up documentation for additions and deletions of materials, labor and other related contract costs for the COR.

E. All CB documentation will be processed through the Construction Administration-Construction Bulletin Library on the Project Management Web Site (PMWS).

1.2. RELATED SPECIFICATIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 26 57 Change Order Request (COR)
C. Section 01 26 63 Change Order (CO)
D. Section 01 31 23 Project Management Web Site
E. Section 01 91 00 Commissioning

1.3. PERFORMANCE REQUIREMENTS

A. Project Architect (PA): The PA shall be the only person authorized to publish a CB as needed for any reason indicated in section 1.1.A above. The PA shall consult as necessary with any of the following while drafting the CB and shall confirm final direction with the CPM prior to issuing a CB:
   1. City Project manager (CPM)
   2. Owner
   3. Members of the consulting staff
   4. Members of city staff
   5. The General Contractor
   6. Sub-contractors
   7. Commissioning Agent (CxA)

B. General Contractor: The GC shall be responsible for the following as needed:
   1. Executing the directives of the CB when he/she believes that no changes in labor, materials, equipment, or contract duration will be required for additions or deletions.
   2. Submit a COR when he/she believes that a change in labor, materials, equipment or contract duration will be required for additions or deletions.

1.4. QUALITY ASSURANCE

A. The PA shall be responsible for ensuring the final CB sufficiently provides direction, details, specifications and other information as necessary for the GC to perform the intended Work.

B. The PA shall be responsible for ensuring the final CB is published as expeditiously as practical based on the complexity of the CB being written. CBs that may affect the GC critical path shall be given priority.

PART 2 – PRODUCTS

2.1. CONSTRUCTION BULLETIN FORM

A. The CB form is located on the Project Management Web Site. The PA shall click the link in the left margin of the project web site opening a new form. Project information is pre-loaded, the PA only needs to enter information and make attachments as needed to complete the form.

PART 3 - EXECUTION

3.1. WRITING THE CONSTRUCTION BULLETIN

A. The PA shall draft a CB as needed using the Construction Bulletin form on the Project Management Web Site.
   1. The PA and/or consulting staff as necessary shall provide specifications, model numbers and performance data, details and other such information necessary to clearly state the intentions of the CB.
   2. The consulting staff, CPM, Owner, CxA and other City Staff shall review the draft and recommend changes as needed.
   3. The PA shall amend the draft as necessary into a final CB for review

B. Once the final CB has been approved the PA shall “Submit” the CB through the Project Management Web Site to the GC.

3.2. EXECUTING THE CONSTRUCTION BULLETIN

A. The GC shall acknowledge receipt of the CB on the Project Management Web Site as instructed in the Tutorial Manual provided to the awarded contractor.

B. The GC shall notify all Sub-contractors of the CB and publish the CB to all field sets of drawings and specifications as appropriate.

C. The GC shall execute the directives of the CB or submit COR documentation as necessary during the execution and implementation of the CB.
   1. See Specification 01 26 57 Change Order Request (COR)

END OF SECTION

SECTION 01 26 57
CHANGE ORDER REQUESTS (COR)

PART 1 – GENERAL

1.1. SUMMARY

A. Except in cases of emergency, no changes in the Work required by the Contract Documents may be made by the General Contractor (GC) without having prior approval of the City Engineer or his representative.

B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in the Work by written Change Order (CO). Such changes may include additions and/or deletions.

C. Where the City desires to make changes in the Work through use of written Change Order Request (COR), the following procedures apply:

1. If requested by the City, the GC shall prepare and submit a detailed proposal, including all cost and time adjustments to which the GC believes it will be entitled if the change proposed is incorporated into the Contract. The City shall be under no legal obligation to issue a Change Order for such proposal.
2. The parties shall attempt in good faith to reach agreement on the adjustments needed to the Contract to properly incorporate the proposed change(s) into the Work. In the event that the parties agree on such adjustments, the City may issue a Change Order and incorporate such changes and agreed to adjustments, if any.
3. In some instances, it may be necessary for the City to authorize Work or direct changes in Work for which no final and binding agreement has been reached and for which unit prices are not applicable. In such cases the following shall apply.
    a. Upon written request by the City, the GC shall perform proposed Work
    b. The cost of such change may be determined in accordance with this specification.
    c. In the event agreement cannot be accomplished as contemplated herein, the City may authorize the Work to be performed by City forces or to hire others to complete the Work. Such action on the part of the City shall not be the basis of a claim by the GC for failure to allow it to perform the changed Work.

D. Where changes in the Work are made by the City through use of a force account basis, the GC shall as soon as practicable, and in no case later than ten (10) working days from the receipt of such order, unless another time period has been agreed to by both parties, give the City written Notice, stating:

1. The date, circumstances and source of the extra work; and,
2. The cost of performing extra work described by such Order, if any; and,
3. Effect of the order on the required completion date of the Project, if any.

E. The giving of each Notice by the GC as prescribed by this specification, shall be a requirement to liability of the City for payment of any additional costs incurred by the GC in implementing changes in the Work. Under this specification, no order or statement of the City shall be treated as a Change Order, or shall entitle the GC to an equitable adjustment of the terms of this Contract or damages for costs incurred by the GC on any activity for which the Notice was not given.

F. In the event Work is required due to an emergency as described in this specification the GC must request an equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the commencement of such emergency.

G. All GC requests for equitable adjustment shall be submitted to the CPM per the specifications below. Such requests shall set forth with specificity the amount of and reason(s) for the proposed adjustment and shall be accompanied by supporting information and documents.

H. No adjustment of any kind shall be made to this Contract, if asserted by the GC for the first time, after the date of final payment.

I. This specification shall be used by the GC when preparing documentation for any COR to ensure each has been properly and completely filled out as required by the City of Madison.

J. All COR documentation will be processed through the Construction Administration-Change Order Request Library on the Project Management Web Site (PMWS).

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 26 13 Request for Information (RFI)

B. Section 01 26 46 Construction Bulletins (CB)

C. Section 01 26 63 Change Order (CO)

D. Section 01 31 23 Project Management Web Site

E. Section 01 91 00 Commissioning

F. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".

1. Use the following link to access the Standard Specifications web page:
   http://www.cityofmadison.com/business/pw/specs.cfm
   a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
   b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.

1.3. DEFINITIONS AND STANDARDS

A. LABOR: The amount of time and cost associated with the performance of human effort for a defined scope of Work. Labor is further defined as follows:
   1. Labor rate is the total hourly rate which includes the basic rate of pay, fringe benefits plus each company's cost of required insurance, also referred to as a reimbursable labor rate.
   2. Unit labor is the labor hours anticipated to install the corresponding unit of material.
   3. Labor cost is the labor hours multiplied by the hourly labor rates.

B. MATERIAL: Actual material cost is the amount paid, or to be paid, by the GC for materials, supplies and equipment entering permanently into the Work, including cost of transportation and applicable taxes. The cost shall not exceed the usual and customary cost for such items available in the geographical area of the project

C. LARGE TOOLS AND MAJOR EQUIPMENT: Large tools and major equipment are those with an initial cost greater than $1,500, whether from the GC or other sources.
   1. Tool and equipment use and time allowed is only for extra work associated with change orders.
      a. Rental Rate is the machine cost associated with operating a piece of equipment for a defined length of time (hour, day, week, or month) and shall not exceed the usual and customary amount for such items available in the geographical area of the project.
      b. Rental cost is the rental rate multiplied by the anticipated duration the equipment shall be required.
   2. The GC shall provide a breakdown of all rental rates to indicate what items and costs are associated with the rate. Examples of items to include in the breakdown would be fuel consumption, lubrication, maintenance and other similar expenses but not including profit and overhead.
   3. When large tools and equipment needed for Change Order work are not already at the job site, the actual cost to get the item there is also reimbursable.

D. BOND COST: The cost shall be calculated at 1% of the total proposed change order.

E. SUB-CONTRACTOR COSTS: Sub-contractor costs are for those labor, material, and equipment costs required by subcontracted specialties to complete the Change Order work.

F. OVERHEAD AND PROFIT Markup: The allowable markup percentage to a COR by the GC and Sub-contractors for overhead and profit. All of the following are expenses associated with overhead and profit and shall not be reimbursable as individual items on any COR:
   1. CHANGE ORDER PREPARATION: All costs associated with the preparing and processing of the change order.

2. DESIGN, ESTIMATING, AND SUPERVISION: All such efforts, unless specifically requested by Owner as additional Work to be documented as a COR or portion thereof.
3. INSTALLATION LAYOUT: The layout required for the installation of material and equipment, and the installation design, is the responsibility of the GC.
4. SMALL TOOLS AND SUPPLIES: The cost of small hand tools with an initial cost of $1,500 or less, along with consumable supplies and expendable items such as drill bits, saw blades, gasoline, lubricating or cutting oil, and similar items.
5. GENERAL EXPENSE: The general expense, which is those items that are a specific job cost not associated with direct labor and material such as job trailers, foreman truck, and similar items.
6. RECORD DRAWINGS: The preparation of record or as-built drawings.
7. OTHER COSTS: Any miscellaneous cost not directly assessable to the execution of the Change Order including but not limited to the following:
    a. All association dues, assessments, and similar items.
    b. All education, training, and similar items.
    c. All drafting and/or engineering, unless specifically requested by Owner as additional Work to be documented as a Change Order proposal or portion thereof.
    d. All other items including but not limited to review, coordination, estimating and expediting, field and office supervision, administrative work, etc.

G. Contract Extension: The necessary amount of time to be added to the contract deadlines for the completion of a change order.

1.4. CONTRACT EXTENSION

A. The GC shall not assume that every COR will require a Contract Extension. If the GC feels a contract extension is warranted he/she shall provide sufficient scheduling information that shows how the COR being requested impacts the critical path of the project.

B. The City of Madison strongly encourages the GC to explore alternative methods and practices prior to submitting a COR with a request for contract extension.

1.5. OVERHEAD AND PROFIT MARKUP

A. Pursuant to the City of Madison Standard Specifications for Public Works Construction, Section 104.7, Extra Work, the following maximum allowable markups shall be strictly enforced on all change orders associated with the execution of this contract.
    1. The total maximum overhead and profit shall not exceed fifteen percent (15%) of the total costs.
    2. The total maximum overhead and profit shall be distributed as follows:
        a. For work performed and materials provided solely by the General Contractor, fifteen percent (15%) of the total costs.
        b. For work performed and materials provided solely by Sub-contractors and supervised by the General Contractor:
            i. Supervision of the GC, five percent (5%) of the total Sub-contractor cost.
            ii. Sub-contractors work and materials ten percent (10%) of the total Sub-contractor cost.

1.6. PERFORMANCE REQUIREMENTS

A. The GC shall become thoroughly familiar with this specification as it will identify procedures and expenses that are or are not allowed under the Change Order and Change Order Request process.

B. The GC shall be responsible for all of the following:
    1. Carefully reviewing the CB that is associated with the COR.
    2. Collecting required supporting documentation from all contractors that quantify the need for a COR.
        a. Labor hours and wage rates
        b. Material costs
        c. Equipment costs

C. The following shall apply to establishing prices for labor, materials, and equipment costs:
    1. Where Work to be completed has previously been established by individual bid items in the contract bid proposal the GC shall use the unit bid prices previously established.
    2. Where Work to be completed was bid as a Lump Sum without individual bid items the GC shall provide a breakdown of all labor, materials, equipment including unit rates and quantities required.

D. The completion date is determined by Owner. The schedule, however, is the responsibility of the GC. Time extensions for extra Work will be considered when a schedule analysis of the critical path shows that the Change Order Request places the Work beyond the completion date stated in the Contract.

1.7. QUALITY ASSURANCE

A. The GC shall be responsible for ensuring that all COR supporting documentation meets the following requirements prior to completing the COR form on the Project Management Web Site:
   1. Sufficiently indicates labor, material, and other expenses related to completing the intent of the CB.
   2. No costs exceed the usual and customary amount for such items available in the geographical area of the project, and no costs exceed those established under the contract.

B. The Project Architect (PA), Commissioning Agent (CxA), City Project Manager (CPM), other members of the consulting staff, and city staff shall review all COR requests to ensure that the intent of the CB will be met under the proposal of the COR or request additional information as necessary.

PART 2 – PRODUCTS

2.1. CHANGE ORDER REQUEST FORM

A. The COR form is located on the Project Management Web Site. The GC shall click the link in the left margin of the project web site opening a new form. Follow additional instructions below in the execution section for filling out the form.

PART 3 - EXECUTION

3.1. ESTABLISHING A CHANGE ORDER REQUEST

A. Upon receipt of a Construction Bulletin (CB) where the GC believes a significant change in contract scope warrants the submittal of a COR the GC shall do all of the following within ten (10) working days after receipt of the CB:
   1. Review the CB with all necessary trades and sub-contractors required by the change in scope.
      a. Additions or deletions to the contract scope shall be as directed within the CB.
      b. Additions or deletions of labor and materials shall be determined by the GC based on the directives of the CB.
   2. Assemble all required back-up documentation for additions and deletions of materials, labor and other related contract costs as previously outlined in this specification.
   3. Submit a COR request form on the Project Management Web Site.

B. Submitting a COR does not obligate the GC to complete the work associated with the COR nor does it obligate the Owner to approve the COR as a change to the contract.

3.2. SUBMIT A CHANGE ORDER REQUEST FORM

A. This specification shall provide a subject overview only. In depth instructions shall be provided to the awarded Contractor in a PDF Instructional Manual.

B. The GC shall select the “Submit a COR” link on the Project Management Web Site.

C. The software will open a new COR form and the GC shall provide all of the following information:
   1. DO NOT perform any calculations on this worksheet, only provide the raw data as requested below. All calculations, totals, and markups shall be computed as described within this specification.
   2. Provide a summary description of the COR request, and justification for any requested time extension to the contract, indicate the number of calendar days being requested for the extension and add any attachments to the form as needed.
   3. Provide all GC self performance data including all of the following:
      a. Materials description, quantities, and unit costs.
      b. Labor hours and rates for all Foremen, Journeymen, and Apprentices by trade.
      c. Equipment descriptions, quantities, unit costs and rates.
   4. Provide all Sub-contractor data including all of the following:
      a. Materials description, quantities, and unit costs.
      b. Labor hours and rates for all Foremen, Journeymen, and Apprentices by trade.
      c. Equipment descriptions, quantities, unit costs and rates.
   5. Ensure all calculations performed by the form have been completed correctly. Contact the CPM directly if you suspect an error before hitting the save button.

C. At any time after creating a COR you must at a minimum click “Save as Draft” to save your work.

D. When all data has been entered and verified click on the “Submit COR” button. This will kick off the COR Review and Approval process.

3.3. CHANGE ORDER REQUEST REVIEW, APPROVAL, AND PROCESSING

A. The PA and CPM shall review all CORs submitted by the GC.
   1. Additional consulting staff and city staff having knowledge of the components of the COR shall review and advise the PA and CPM as to the accuracy of the items, quantities, and associated costs of the COR as directed by the CB.
   2. The CPM shall review the COR with the Owner.

B. If required the PA and CPM, shall in good faith, further negotiate the COR with the GC as necessary. All amendments to any COR shall be documented within the Project Management Web Site software.

C. After final review of the COR the CPM and Owner may accept the COR.

D. The CPM shall prepare the COR in the form of an official Board of Public Works Change Order for final review and approval as outlined in Section 01 26 63 Change Order (CO).

E. The GC shall not act upon any accepted COR until it has received final approval through the Public Works process as an official CO to the Work unless instructed to do so by the CPM. Proceeding without the final approval of a fully authorized Change Order is at the GC's own risk.

3.4. EMERGENCY CHANGE ORDER REQUEST

A. In the event Work is required due to an emergency as described in the Contract Documents, the GC must request an equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the commencement of such emergency.

B. The GC shall provide full documentation of all labor, materials and equipment used during the period of emergency as part of the COR submittal.

END OF SECTION

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SECTION 01 26 63
CHANGE ORDER (CO)

PART 1 – GENERAL

1.1. SUMMARY

A. Except in cases of emergency, no changes in the Work required by the Contract Documents may be made by the General Contractor (GC) without having prior approval of the City Project Manager (CPM).

B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in the Work by written Change Order. Such changes may include additions and/or deletions.

C. The Change Order (CO) is a Board of Public Works (BPW) form that is reviewed and approved by a specific process.

D. The CO form is typically made up of multiple Change Order Requests (CORs) and/or Bid Items as appropriate depending on the type of project and how the contract was bid.

E. All CO documentation shall be processed through the Construction Administration-Change Order Library and digital workflow on the Project Management Web Site (PMWS).

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 26 46 Construction Bulletin (CB)
C. Section 01 26 63 Change Order Request (COR)
D. Section 01 31 23 Project Management Web Site
E. Section 01 91 00 Commissioning

1.3. BOARD OF PUBLIC WORKS PROCEDURE

A. The Board of Public Works has a very explicit procedure for the review and approval of all change orders associated with any Public Works Contract as follows:
   1. The Supervisory Chain of the CPM shall review and approve any CO under $20,000 provided it does not include either of the following:
      a. The CO does not request a time extension to the contract.
      b. The CO does not cause the contract contingency sum to be exceeded.
   2. The Board of Public Works shall review and approve any CO that requires any of the following:
      a. Any CO over $20,000.
      b. Any CO requesting a time extension to the contract regardless of the monetary value of the CO.
      c. Any CO that that causes the contract contingency sum to be exceeded.

B. The Board of Public Works generally meets every other week and only once in August and December. The GC is cautioned that, under normal scheduling, a CO requiring a BPW review will take a minimum of two (2) weeks to achieve final approval.
   1. The City shall not be responsible for additional delays to the Work caused by the scheduling constraints of the Board of Public Works.

C. *SPECIAL NOTE:* The GC is cautioned to never proceed unless told to do so by the CPM. Only in rare instances may the CPM give a written notice to proceed on a COR without an approved CO. Proceeding without the written notice of the CPM or an approved CO is at the GC's own risk.

PART 2 – PRODUCTS

2.1. CHANGE ORDER FORM

A. The CO form is located on the Project Management Web Site. The CPM shall click the link in the left margin of the project web site opening a new form. Project information is pre-loaded, the CPM only needs to enter information and make attachments as needed to complete the form.

PART 3 - EXECUTION

3.1. PREPARATION OF THE CHANGE ORDER

A. The CPM shall prepare the required CO forms in the Construction Administration-Change Order Library on the Project Management Web Site as follows:
   1. Provide information for all contract information.
   2. Provide a general description of the items described within the change order.
   3. Provide detailed information for each Item on the CO form. At the option of the CPM he/she may include multiple Change Order Requests each as their own item.
   4. Provide required pricing and accounting information as needed for the item.
   5. Insert attachments of contractor/architect provided information that clarifies and quantifies the CO. Attachments may include but not be limited to material lists, estimated labor, revised details or specifications, and other documents that may be related to the requested change.
   6. Save the final version of the completed CO.

3.2. EXECUTION OF THE CHANGE ORDER

A. Upon saving the CO as described in section 3.1 above the software associated with the Project Management Web Site shall notify the GC that the CO has been drafted and is ready for review. The GC shall do the following:
   1. Open the appropriate CO form in the Construction Administration-Change Order Library and review all items on the form.
   2. The GC shall notify the CPM immediately of any errors or discrepancies on the form and shall not sign or save it.
      a. The CPM shall make any corrections as needed, re-save the form, and notify the GC.
   3. If/when the GC concurs with the CO form as drafted the GC shall digitally sign the form and click SAVE.

B. After the GC digitally signs/saves the CO it shall be routed through the Project Management Web Site for additional review and/or approvals. The CPM shall do the following:
   1. Monitor the review process to ensure the software is working properly at each review step.
   2. Ensure that proper BPW procedures are executed as needed by the CO approval process.
      a. Schedule the CO on the next available BPW agenda if required.
         i. Attend the BPW meeting to speak on the CO to board members and answer questions.
         ii. The GC and/or PA may be required to attend the BPW meeting to address specific information as it relates to the Work and/or materials associated with the CO.
   3. Monitor final approval and distribution of the CO.
   4. Notify the GC that the CO has been completed.
   5. Ensure that the CO is posted to the next Public Works payment schedule.
   6. Verify that the GC's next Progress Payment-Schedule of Values show the CO as part of the contract sum.

C. Upon final approval of the CO the GC may proceed with executing the Work associated with the CO.

END OF SECTION

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 – GENERAL

1.1. SUMMARY

A. The Schedule of Values (SOV) is a Contractor provided statement that allocates portions of the total contract sum to various portions of the contracted work and shall be the basis for reviewing the Contractors Progress Payment Requests.

B. AIA Document G702 – Application and Certificate for Payment and AIA Document G703 Continuation Sheet shall be filled out in sufficient detail to be used as a guideline in determining work completed and materials stored on site when verifying Progress Payment Requests.

C. The General Contractor shall be responsible for filling out, updating, and providing these work sheets with each Progress Payment Request.

1.2. RELATED SPECIFICATIONS

A. Section 01 26 63 Change Order (CO)
B. Section 01 29 76 Progress Payment Procedures
C. Section 01 31 23 Project Management Web Site
D. Section 01 32 26 Construction Progress Reporting
E. Section 01 33 23 Submittals
F. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".
   1. Use the following link to access the Standard Specifications web page:
      http://www.cityofmadison.com/business/pw/specs.cfm
      a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
      b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.

1.3. RELATED DOCUMENTS

A. The following documents shall be used as the basis for initiating and maintaining the SOV worksheets throughout the execution of this contract.
   1. Drawing documents and specifications (including general provisions) as provided with the bid set documents and any published addendums.
   2. Documents associated with revisions or clarifications to number 1 above after awarding of the contract, including but not limited to:
      a. Construction Bulletins
      b. Request for Information
      c. Approved Change Orders
   3. The latest daily/weekly Construction Progress Report
   4. Other specifications as identified in Section 1.2 above

1.4. BASIS OF VALUES

A. The Contractor shall provide a breakdown of the Contract Sum in sufficient detail to assist the Architect and City Project Manager in evaluating Progress Payment Requests. The breakdown detail may require a labor and material breakdown for each division of work or trade or as directed by the CPM.

B. The total sum of all items shall equal the Contract Sum.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. AIA DOCUMENT G702 – APPLICATION AND CERTIFICATE FOR PAYMENT

A. The Contractor shall use AIA Document G-702 Application and Certificate for Payment with each Progress Payment Request.

B. Completely fill out the Project Information section as follows:
   1. TO OWNER; provide all owner related information as provided in the contract documents.
   2. PROJECT; provide all contract information including contract number, title and address.
   3. FROM CONTRACTOR; provide all contractor related information.
   4. VIA ARCHITECT; provide all the architect's related information including the architect's project reference number if different from the owners.
   5. Indicate the current APPLICATION NO., PERIOD TO date, and CONTRACT DATE.

C. Completely fill out the Contractors Application for Payment section.
   1. Fill out lines 1 through 9 to reflect the current status of the contract through the payment date being requested.
   2. The City of Madison calculates retainage on Public Works Contracts as follows:
      a. In general, across the duration of the contract, 2.5% of the total contract sum, including change orders, is withheld for retainage as referenced from the City of Madison Standard Specification 110.2:
         i. Beginning with Progress Payment 1, 5% retainage will be withheld until such time that 50% of the total contract sum has been paid out.
         ii. No additional retainage will be withheld after 50% of the total contract sum has been paid, unless additional change orders have been approved after the 50% milestone has been reached. Per City of Madison Standard Specification 110.2, additional retainage up to 10%, may be held in the event there are holds placed by Affirmative Action or liquidated damages by BPW.
         iii. Retainage for additional change orders after the 50% milestone will be withheld at the rate of 2.5% of the total cost of the change order.
         iv. Retainage is based on the change orders posted to the City's contract worksheet at the time the progress payment is processed.

D. Completely fill out the Change Order Summary section. Only change orders that have been finalized and posted to the City of Madison's Application for Partial Payment worksheet may be itemized into the SOV documents.

E. The Contractor shall sign and date the application and it shall be properly notarized.

F. The Contractor shall not fill in any information in the Architects Certificate for Payment section.

3.2. AIA DOCUMENT G703 – CONTINUATION SHEET

A. The Contractor shall use AIA Document G-703 Continuation Sheet to itemize his/her SOV for this contract. Provide additional sheets as necessary.

B. Provide information in Column A (Item No.), Column B (Description of Work), and Column C (Scheduled Value) by any method that allocates portions of the total contract sum to various portions of the contracted work. Possible methods include combinations of the following:
   1. By division of work
   2. By contractor, sub-contractor, sub sub-contractor
   3. By specialty item or group
   4. Other methods of breakdown as may be requested by the City Project Manager or City Construction Manager at the pre-construction meeting.

C. Provide total cost of the item/description of work including proportionate shares of profit and overhead related to the item.

3.3. INITIAL SCHEDULE OF VALUES SUBMITTAL

A. The Contractor shall upload his/her initial SOV to the Project Management Web Site, Submittals Library, no later than five (5) working days after the Pre-construction Meeting.
   1. The initial SOV shall provide information in Column A (Item No.), Column B (Description of Work), and Column C (Scheduled Value) only.
   2. The level of detail shall be as described in section 3.2 above.

B. The Project Architect (PA) and the City Project Manager (CPM) shall review the SOV as any other submittal and may require modifications to reflect additional detail as necessary.

C. The Contractor shall resubmit the SOV as necessary until such time as the PPA and CPM have sufficient detail for assessing and approving future Progress Payment Applications.

D. Progress Payment Application 1 will not be processed until such time as the Contractor has met this requirement regardless of the amount of work completed per the application.

3.4. SOV FOR PROGRESS PAYMENT REQUESTS

A. The Contractor shall update the initial SOV with each Progress Payment Application as follows:
   1. Initial items and values as part of Section 3.3 above will not be adjusted once the original Schedule of Values submittal has been approved.
   2. Change orders shall be added as additional items and values at the bottom of the SOV as they become approved and posted to the City's contract worksheet. The value for each change order shall be the value indicated on the SOV and shall stand alone. Values shall not be split out or combined with other existing items with similar work descriptions on the original SOV.
   3. Fill out Columns D, E, F and G to properly reflect the work completed and materials received since the last Progress Payment Application.
   4. Only materials delivered and stored on the project site may be reflected on SOV progress updates.

B. Provide updated G702 and G703 sheets with each Progress Payment application.

C. See Specification 01 29 76 Progress Payment Procedures for additional information on submitting Progress Payment Applications.

END OF SECTION

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SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

PART 1 – GENERAL

1.1. SUMMARY

A. The General Contractor (GC) shall review this and all related specifications prior to submitting progress payment requests.

B. Progress payment requests (Partial Payment-PP) for this contract shall be uploaded digitally by the GC to the Project Management Web Site

C. The Project Architect (PA) and City Project Manager (CPM) shall review and amend or approve the PP on the Project Management Web Site.

D. After approval of the PP by the CPM, he/she shall forward the PP to the appropriate agencies for BPW contractual review and payment processing.

1.2. RELATED SPECIFICATIONS

A.	Section 01 26 63	Change Order (CO)
B.	Section 01 29 73	Schedule of Values
C.	Section 01 31 19	Progress Meetings
D.	Section 01 31 23	Project Management Web Site
E.	Section 01 32 16	Construction Progress Schedules
F.	Section 01 32 26	Construction Progress Reporting
G.	Section 01 33 23	Submittals
H.	Section 01 45 16	Field Quality Control Procedures
I.	Section 01 77 00	Closeout Procedures
J.	Section 01 78 13	Completion and Correction List
K	Section 01 78 23	Operation and Maintenance Data
L.	Section 01 78 36	Warranties
M.	Section 01 78 39	As-Built Drawings
N.	Section 01 78 43	Spare Parts and Extra Materials
O.	Section 01 79 00	Demonstration and Training

1.3. RELATED DOCUMENTS

A. The following documents shall be used when evaluating PP requests.

1. Daily and weekly construction progress reports filed since the last payment request.
2. Contractors Schedule of Values as updated from the last payment request. See Specification 01 29 73.
3. Any document that may be required to be submitted for review and approval, as noted by the specifications listed in Section 1.2 above, or the Progress Payment Milestone Schedule in Section 1.4 below, to achieve a required bench mark of contract progression or contract requirement.

1.4. PROGRESS PAYMENT MILESTONES

A. City Engineering-Facility Management has developed the Project Payment Milestone Schedule (Section 1.4 below) to assist the GC in providing required construction specific documentation and general contractual documentation in a timely manner.

B. The Progress Payment Milestone Schedule is not an all inclusive list. Multiple agencies review progress payment requests and contract closeout requests. Missing, incomplete, or incorrect documentation for any agency may

be a cause for not processing progress payments. It shall be the sole responsibility of the Contractor for providing documentation as required or requested to the appropriate agencies.

C. The milestone schedule is based on the contract total sum and shall be valid for most contracts. Milestone submittals will be required with whatever progress payment hits the percentage of contract total indicated in the schedule.

D. The CPM shall review the milestone schedule with each progress payment request and at his/her option may elect to hold processing the progress payment until such time as the contractor has met the requirements for providing construction specific documentation.

E. It shall be the General Contractors responsibility to comply with all BPW Contract Administration requirements and related deadlines as outlined in the Award Letter, Award Checklist, and Start Work Letter.

Progress Payment (PP) Milestone Schedule		
Milestone Description	***Due Before***	***Remarks***
BPW Contract Administration Documentation • Workforce profiles • Best Value Contracting Documentation • Sub-contractors prequalification approval & Affirmative Action plans • Other as may be required	PP-1, or start work as applicable	• For GC and Sub-contractors before PP-1 regardless of scheduling • Sub-contractors (if applicable), due 10 days before they may start work • Sub-contractors (if applicable), due 10 days before they may start work
Required Construction Submittals/Administrative Documents • Contractors Project Directory • Schedule of Values • Submittals Schedule • Waste Management Plan • Closeout Requirement Checklist • Warranty Checklist •	PP-1	References • Specification 01 31 23 • Specification 01 29 73 • Specification 01 32 19 • Specification 01 74 19 • Specification 01 77 00 • Specification 01 78 36 •
Construction Progress Milestones • Early submittals, per submittal schedule • Detailed Contract Schedules	PP-1	See specifications for specific requirements • Specification 01 32 19, Examples: concrete mix, structural steel, products with long lead times • See Specification 01 32 16
General Construction Progress Requirements are all up to date • Progress Schedules • Submittals/Re-submittals (ongoing) • Schedule of Values • Progress Reporting • LEED Documentation • Waste Management documentation • QMOs are being addressed and closed • Progress Cleaning • As-Built Drawings	Each future PP	Verified with each Progress Payment Request • Specification 01 32 16 • Specification 01 33 23 • Specification 01 29 73 • Specification 01 32 26 • All specifications with LEED documentation requirements • Specification 01 74 19 • Specification 01 45 16 • Specification 01 74 13 • Specification 01 78 39
*** All of the above are being updated on the Project Management Web Site as required**		
BPW Contract Administration Documentation • Weekly payroll reports • Best Value Contracting Reports • SBE Reports	25% CT or PP 2	See 1.4.E above. *This progress payment will be with held by BPW for any missing contractual documentation.*

Progress Payment (PP) Milestone Schedule		
Milestone Description	***Due Before***	***Remarks***
Construction Progress Milestones • Construction/Contract Closeout Meeting #1 • Submittals/Re-submittals complete	50% CT	• Specification 01 31 19 • Specification 01 33 23
Operation and Maintenance (O & M) drafts	60% CT	• Specification 01 78 23
Construction/Contract Closeout Meeting #2 • Construction closeout checklist	70% CT	• Specification 01 31 19 • Specification 01 77 00
BPW Contract Administration Documentation • Request Finalization Review from BPW	80% CT	This is a recommendation to the GC and is not a requirement of this PP. • Specification 01 77 00
Construction Progress Milestones • Operation and Maintenance (O & M) finals, accepted • All major QMO issues resolved • As-Built Drawings, Division Trades ready for GC review	80% CT	• Specification 01 78 23 • Specification 01 45 16; Items that could prevent occupancy • Specification 01 78 39
All of the following shall be completed for this PP: • Regulatory Inspections completed • All QMO reports closed • Demonstration and Training completed • Attic Stock completed • Final Cleaning	90% CT	Contractor to determine the proper order of completion: • Governing ordinances and statutes • Specification 01 45 16 • Specification 01 79 00 • Specification 01 78 43 • Specification 01 74 13
Construction Closeout Procedures: • Letter of Substantial Compliance sent to BI and DHS as needed • Certificate of Occupancy issued • As-Built Drawings, finals, accepted • City Letter of Substantial Completion • Warranty letters dated and issued	100% CT	• Specification 01 77 00 • Generated/Signed by the Architect • Building Inspection • Specification 01 78 39 • Signed by the City Engineer • Specification 01 78 36
*** Completion of this begins the one year warranty.**		
BPW Contract Administration Documentation Contract Closeout Procedures • Construction Closeout has been completed • Contractor requests final payment of retainage upon receiving City Letter of Substantial Completion • All BPW contractual requirements are verified	Final	• Specification 01 77 00 • Contractor must provide any missing BPW Contractual Documentation
*** Completion of this closes the contract but not the warranty period/bond.**		
NOTE: **CT = Contract Total less held retainage**		

1.5. PROGRESS PAYMENT SUBMITTAL

A. Each progress payment submittal shall be:
   1. Digital in PDF format
   2. PDF shall be in color
   3. Uploaded to the appropriate Project Management library and properly named per the tutorial instructions provided to the awarded contractor.

B. Submit all required construction progress documentation to the appropriate Project Management Web Site library.

C. In general the following shall apply to all PP requests:
   1. Materials or products:
      a. On order, being shipped, etc. may not be invoiced.
      b. Received and stored on the project site may be invoiced.
      c. Being manufactured off site at any location may not be invoiced (example: cabinetry, ductwork, etc.)
      d. Completed products stored off site locally waiting for delivery to the project site may be invoiced with prior approval by the CPM. All of the following conditions must be met to be allowed:
         i. Items must be visually inspected by CPM to verify product is complete.
         ii. Item must be stored inside a compatible structure and the structure and contents must be insured.
         iii. Contractor is responsible for condition until installation is completed.
   2. All labor and equipment, including rental time for the current progress period may be invoiced.
   3. Only completed installations may be invoiced to 100% based on the Schedule of Values.

D. DO NOT submit BPW Contract Administration Documentation for review with Progress Payment Requests, submit them directly to the correct agency and in the correct format as instructed from information in your BPW Contract Award Packet instructions.

PART 2 - PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL CONTRACTOR PROCEDURE

A. The GC shall provide an updated version of his/her schedule of values (AIA documents G702 & G 703) with each PP request.
   1. The AIA - Application and Certificate for Payment (G702) shall be properly filled out and prepared for the Architects review. See specification 01 29 73, Schedule of Values for more information.
   2. The AIA - Continuation sheets (G703) shall be properly filled out and indicate the dollar value of the completed work to date for each item on the form. See specification 01 29 73, Schedule of Values for more information.
      a. The GC shall subtotal the work completed to date for all of the original Schedule of Value items.
      b. Divide the sub total of work completed by the Original Contract Total to obtain a percentage complete of the original Lump Sum Bid. This percentage may be taken out to five (5) decimal places (round fifth place up or down as needed).
         i. Example: $5,192.55 of completed work divided by $10,000 original Contract Total = 0.519255, round this to 0.51926
      c. Write the percentage in Column 10 on the City Tabular Sheet for the original lump sum bid item in RED ink.
   3. Ensure that any newly posted change orders from the City of Madison provided tabulation sheet have been entered on the G703 continuation sheets. Repeat steps a thru c above for each change order on the schedule of values and the City Tabular Sheet.

B. The GC shall fill out the City of Madison Application and Certificate of Payment cover sheet as follows:
   1. The GC shall not change any pre-printed information and shall not write in the box that indicates previous progress payments.
   2. The GC shall sign and date the form where indicated.
   3. The GC shall provide the dates from and to for the PP being requested.
   4. The GC shall provide the list of all contractors/sub-contractors that were actively working during the dates indicated above.

a. All contractors/sub-contractors named must be in compliance with all City requirements (Pre-qualified, Affirmative Action Plan on file, etc). The PP will be held and not processed by the City of Madison until all contractors/sub-contractors are in compliance.
b. Do not list the names of suppliers or manufacturers, doing so will slow down processing and require a re-submittal of the paperwork.

C. The General Contractor (GC) shall scan all of the documents listed below in the order shown, save the scan as a single PDF file for each PP request.
1. City cover sheet – Application and Certificate for Payment
2. City tabulation sheet(s)
3. AIA G702 - Application and Certificate for Payment
4. AIA G703 - Continuation Sheet(s)
5. Any miscellaneous documents that may be requested as backup documentation for the pay request.
a. Lien waivers are not required and shall not be submitted.
b. Do not provide contractual administrative documents such as pay reports with pay requests.
c. Do not supply progress deliverables with pay requests.

F. Upload the pay request PDF to the Contract Documents-GC Partial Pay Apps library on the Project Management Web Site.

3.2. PROJECT ARCHITECT PROCEDURE

A. The PA shall review the AIA-continuation sheets provided by the GC to determine if the Schedule of Values accurately reflects the work completed for the inclusive dates indicated.
B. The PA shall advise the CPM of any discrepancies in the schedule of values.
C. The PA shall work with the GC and the CPM to resolve any issues prior to signing the AIA - Application and Certificate for Payment.
D. When verified, the PA shall digitally sign the original PDF version of the AIA - Application and Certificate for Payment on the Project Management Web Site.

3.3. CITY PROJECT MANAGER PROCEDURE

A. The CPM shall review all documents submitted by the GC and work with the PA to ensure the schedule of values accurately reflects the work completed to date.
B. The CPM may elect to hold processing of any progress payment pending submittal of required progress payment milestones.
C. When verified, the CPM shall digitally sign the City Cover Sheet and forward the required documentation to the appropriate City agencies for further processing of the payment request.
D. The CPM shall add a scanned copy of any documents indicating the PP request processing was completed to the PMWS.

END OF SECTION

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SECTION 01 31 13
PROJECT COORDINATION

PART 1 – GENERAL

1.1. SUMMARY

A. Project Coordination covers many areas within the execution of the Contract Documents and the requirements of proper coordination are the applicable to all contractors executing the Work of this contract.

B. This specification provides general information regarding project coordination for the General Contractor and all Sub-contractors. All contractors shall be familiar with project coordination requirements and responsibilities that may be defined in other specification within these Contract Documents.

C. The General Contractor shall at all times be responsible for the project, project site, and execution of the Contract Documents.

1.2. RELATED SPECIFICATIONS

A.	Section 01 29 76	Progress Payment Procedures
B.	Section 01 31 19	Progress Meetings
C.	Section 01 31 23	Project Management Web Site
D.	Section 01 32 16	Construction Progress Schedules
E.	Section 01 32 19	Submittals Schedule
F.	Section 01 33 23	Submittals
G.	Section 01 43 39	Mockups
H.	Section 01 45 16	Field Quality Control Procedures
I.	Section 01 60 00	Product Requirements
J.	Section 01 77 00	Closeout Procedures, including all specifications referenced therein
K.	Section 01 91 00	Commissioning

1.3. GENERAL REQUIREMENTS

A. The following general requirements shall applicable to all contractors:
   1. Cooperate with the Owner, all authorized Owner Representatives, Project Architect and all consultants of the Owner.
   2. Materials, products, and equipment shall be new, as specified and to industry standards except where otherwise noted.
   3. Labor and workmanship shall be of a high quality and to industry standards.

B. Existing conditions:
   1. Verify all existing conditions noted in the contract documents with actual filed locations. Verify dimensions, sizes and locations, of structural, equipment, mechanical and utility components.
   2. Report any inconsistencies, errors, omissions, or code violations in writing to the General Contractor (GC) immediately.
   3. Annotate any inconsistencies, errors, omissions on the GC As-Built record drawings immediately for future reference.

C. Contract Documents:
   1. The Contract Documents are intended to include everything necessary to perform the work. Every item required may not be specifically mentioned, shown, or detailed.
      a. Except where specifically stated all systems and equipment shall be complete, installed, and fully operable.
      b. If a conflict exists within the contract documents the contractor shall furnish the item, system, or workmanship of the highest quality, largest, largest quantity, or most closely fits the intent of the contract documents.

c. Manufacturers recommended installation details shall be verified and used prior to installation of products and equipment so as to not void warranties.

D. Errors and Omissions
1. No Contractor shall take any advantage of any apparent error or omission in the construction documents.
2. The City of Madison shall be permitted to make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the construction documents.

E. Owners Representatives
1. All contractors shall be familiar with various Owner Representatives having Quality Management responsibilities for the duration of this project including but not limited to the following:
   a. Project Architect, responsible for all decisions affecting the code compliance and design intent of the construction documents.
   b. Consulting Architects and Engineers, responsible for providing consulting services to the Project Architect, Owner, and City Project Manager, also responsible for Quality Management of the construction documents.
   c. Owner, the designated representative of the City Agency that will occupy the project upon completion.
   d. City Project Manager, responsible for all day to day decisions regarding the execution and performance of this Public Works Contract.
   e. Consulting City Staff, responsible for providing consulting services to the Project Architect, Owner, and City Project Manager, also responsible for Quality Management of the construction documents.
   f. Commissioning Agent (CxA), responsible for ensuring that the project is meeting the Owner's Project Requirements and related quality assurance procedures.
2. Owner Representatives shall be attending progress meetings, pre-installation meetings, performing or being present for final testing and acceptance and quality management reporting during the execution of the contract documents as outlined in other specifications.

1.4. GENERAL CONTRACTOR PERFORMANCE REQUIREMENTS

A. Assume the responsibility for all Work specified in the Contract Documents except where specifically identified to be performed by the Owner or other contractor separately hired by the Owner.
1. Coordinate all work by Owner, equipment provided Owner, or contractor hired by the Owner into the project schedule.

B. Provide all construction management responsibilities as specified in other Division 1 specifications including but not limited to:
1. Scheduling of work
2. Coordination of work between other Trades and Sub-contractors
3. Construction administration and management
4. Site layout, cleanliness, and protection of completed work/stored materials
5. Waste Management
6. Quality Assurance and Quality Control

C. Use Diggers Hotline and private utility locating companies to accurately locate all public and private utilities on the property as needed. The GC is responsible for any repair or replacement to any public or private utility damaged during the execution of the Work

D. Report any inconsistencies, errors, omissions, or code violations in writing to the Project Architect immediately. Failure to report inconsistencies prior to beginning work shall indicate that the GC accepted all existing conditions.

E. The GC shall be responsible for assigning work and related responsibilities where the Contract Documents may not clearly state who is responsible for providing the work, material, or product.

F. Provide construction management oversight of all items described in Section 1.5 below.

G. Coordinate and assist CxA as outlined within 01 91 00 and as directed by Owner.

1.5. SUB-CONTRACTOR PERFORMANCE REQUIREMENTS

A. Be familiar with all of the contract documents as they pertain to your Work, adjacent work and the overall progress of the project.
1. All Sub-contractors shall be familiar with all Division 1 specifications as they may apply to progress, progress payments, quality control construction management, and closeout of the contract.

B. Coordinate your Work with all adjacent work and existing conditions.

1. Perform your work in proper sequence according to the GC's project schedule and in relation to the work of other trades.
2. Notify other sub-contractors and trades whose work may be connected to, combined with, or influenced by your work and allow them reasonable time and access to complete their work.
3. Join your work to the work of others in accordance with the intent of the Contract Documents.
4. Order materials and schedule deliveries to facilitate the general progress of the Work.

C. Cooperate with all other trades to facilitate the general progress of the work. This shall include providing every reasonable opportunity for the installation of work by others and the storage of their materials and equipment.
1. In no case shall any contractor exclude from the premises or work any Sub-contractor or their employees.
2. In no case shall any contractor interfere with the execution or installation of Work by any other Sub-contractor or their employees.

D. Arrange your work, equipment, and materials and dispose of your construction waste so as to not interfere with the work or storage of materials of others.

E. Coordinate all work as indicated during pre-installation meetings with Owner Representatives, the GC and other trades. Any work improperly coordinated shall be relocated as designated by the Owner Representative at no additional cost to the City.

F. Coordinate and assist CxA as outlined within 01 91 00 and as directed by Owner.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 01 31 19
PROJECT MEETINGS

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to identify various project related meetings and the responsible parties for scheduling, agendas, minutes, and required attendance.

B. This specification is not intended to be inclusive of all meeting types or a complete list of required meetings.

C. This specification is not intended to cover planning and execution meetings between the General Contractor (GC) and his/her sub-contractors.

1.2. RELATED SPECIFICATIONS

A. 01 31 23 Project Management Web Site

B. 01 32 16 Construction Progress Schedules

C. 01 43 39 Mockups

D. 01 91 00 Commissioning

1.3. PROJECT MEETING TYPES

A. The following project meeting types may be used but not limited to the following

1. Preconstruction Meeting
2. Project Management Web Site – Tutorial Meeting
3. Construction Progress Meetings
4. Pre-installation Meetings (including mock-up review meetings)
5. Weekly Trade Meetings
6. Special Meetings
7. Commissioning Meetings

1.4. GENERAL REQUIREMENTS

A. Representatives of Contractors, Subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

PART 2 – PRODUCTS – NOT USED IN THIS SECTION

PART 3 - EXECUTION

3.1. PRECONSTRUCTION MEETING

A. After execution of the Contract the City Project Manager (CPM) shall schedule and conduct the Preconstruction Meeting at the Owner's facilities. The CPM shall coordinate the meeting agenda with the Project Architect and the GC Project Manager.

B. The CPM shall be responsible for the final agenda.

C. The CPM and Project Architect shall take notes on the meeting and post completed meeting minutes.

D. Attendance shall be required by all of the following:

1. Owner Representative(s)

2. Architect and applicable sub consultant(s)
3. General Contractor and applicable subcontractors and suppliers
4. City Quality Management Staff
5. Commissioning Agent
6. Others, as may be invited for particular agenda items.

E. Topics of the Preconstruction Meeting shall include but not be limited to the following:
1. Staff and contractor introductions
2. Completion Date
3. BPW Administrative requirements and due outs
   a. Small Business Enterprise (SBE) (if applicable)
   b. Certified payroll forms
   c. Workforce profiles
   d. Best Value Contracting (BVC)
4. General Facility Management Division 1 Specifications, including:
   a. Section 01 29 76 Progress Payment Procedures
   b. Section 01 31 23 Project Management Web Site (overview)
   c. Section 01 45 16 Field Quality Control Procedures
   d. Section 01 77 00 Closeout Procedures
   e. Section 01 91 00 Commissioning
5. Project Meeting scheduling
   a. Section 01 31 19 Project Meetings
6. Construction Schedule
7. Commissioning Process

3.2. PROJECT MANAGEMENT WEB SITE – TUTORIAL MEETING

A. The CPM shall schedule and conduct a tutorial presentation of the PMWS prior to the beginning of construction.
B. The CPM shall be responsible for the final agenda, there will be no minutes.
C. The required attendance list in 3.1.D. above shall apply except for City Staff in items 1 and 4 who are already familiar with the PMWS system.
D. It is recommended that all contractors bring their lap top, tablet or other internet capable device with them including a fully charged battery and internet connection devices as necessary.

3.3. CONSTRUCTION PROGRESS MEETINGS

A. In general all of the following shall apply:
1. Representatives of Contractors, Subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
2. The attendance shall be from the required attendance list in 3.1.D. above.

B. The General Contractor Project Manager (GCPM) shall:
1. Schedule and conduct all construction progress meetings biweekly or more frequently as required.
2. Prepare agenda for meetings including, but not limited to the following:
   a. Safety
   b. Current Schedule, including review of the critical path and 6-week look ahead schedule
   c. Status of project related documentation (Submittals, RFIs, CBs, etc.)
   d. Quality Observation Log and status of correction of deficient items
   e. Project questions and issues from meeting attendees
   f. BPW Administration Check
   g. Other as needed
   h. Status of CORs and COs to be reviewed outside the standard progress meeting time.
3. Make physical arrangements for meetings.
4. GCPM to post meeting agendas to the appropriate libraries on the Project Management Web Site (PMWS) no less than two (2) working days prior to the scheduled meeting. Notify all required attendees, applicable parties to the contract, and others affected of the posted meeting agenda.
5. Preside at meetings.
6. Route a meeting attendance roster for attendees to sign-in on.
7. GCPM to record the minutes of the meeting; include significant proceedings and decisions. Post meeting minutes to the PMWS no more than two (2) working days after the completed meeting. Meeting minutes shall include a scanned copy of the attendance sign-in sheet. Notify all required meeting attendees, applicable parties to the contract, and others affected by decisions made at the meetings.

8. The above requirements do not apply to GC/sub-contractor meetings.

3.4. PRE-INSTALLATION MEETINGS

A. The GCPM shall schedule and conduct all pre-installation meetings, including mockup reviews, before each construction activity that requires coordination with other trades.
B. The GCPM shall be responsible for the final agenda and meeting minutes.
C. The GCPM will work with all concerned parties to resolve issues as needed and submit RFI's if necessary.
D. Required attendance shall be from the list in 3.1.D. above and shall be personnel having a stake in the outcome of the installation or knowledge of the system being installed.
E. In the event the Contractor installs equipment or materials without a pre-installation meeting the Contractor shall be solely responsible for removing, replacing, repositioning materials and equipment as instructed by the Project Architect or City Project Manager at no additional cost to the City.

3.6 PRE-CONTRACT CLOSEOUT MEETINGS

A. Two (2) Pre-contract Closeout Meetings shall be held to review the closeout procedures, requirements, and contract deliverables.
   1. Pre-contract Closeout Meeting #1 shall be scheduled prior to the 50% Progress Payment Request is being requested. This meeting shall discuss items such as closing out QMO reports, providing O&M drafts and finals, payroll and Affirmative Action documentation, and other contract deliverables.
   2. Pre-contract Closeout Meeting #2 shall be scheduled prior to the 80% Progress Payment Request is being requested. This meeting shall discuss, but not be limited to, the status of scheduling final regulatory inspections, cleaning up outstanding QMO's, demonstration and training, attic stock; and finalization review of payroll and other related documents.
B. The GCPM shall schedule, coordinate, and make physical arrangements for both meetings.
C. All of the following shall be required to attend both meetings:
   1. The GCPM and the GC Field superintendent
   2. All Subcontractor Project Managers regardless of the current status of their work.
      a. The GCPM may excuse a Subcontractor PM if he is confident that all contractual requirements for closeout by the subcontractor have been completed and/or delivered to the GCPM. The list of attendees shall be reviewed and agreed upon with CPM ahead of the meeting.
      b. At the option of these project managers the field supervisors may also attend.
   3. The Project Architect and at least one design consultant from each discipline represented by the plans and specifications to address open QMOs, final tests, reports, etc.
   4. The Owner
   5. The CPM
   6. Quality Management staff as needed to address open QMOs, final tests, reports, etc.
   7. The Commissioning Agent
D. The CPM shall publish an agenda and chair the meeting.

3.7 OTHER SPECIAL MEETINGS

A. The Contractor shall schedule special meetings per the requirements of the LEED Specification, the Project Quality Management Plan, the Commissioning Plan and as indicated by other specifications.
B. Special meetings include but are not limited to the following:
   1. Waste Management Conference
   2. Equipment start up meetings
   3. Testing and balancing meetings
   4. Commissioning meetings
   5. Other meetings as necessitated by the contract documents

END OF SECTION

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SECTION 01 31 23
PROJECT MANAGEMENT WEB SITE

PART 1 – GENERAL

1.1. GENERAL DESCRIPTION

A. The City of Madison (CoM) has established a web based Project Management Tool (PMT) using a Microsoft product called SharePoint (SP).

B. The software is used throughout the design, construction and warranty process of major remodels and new construction projects executed as a City of Madison, Board of Public Works project.

C. Initially deployed in mid-2013, the PMT software has been successfully deployed on several projects, and we continue to modify/update/enhance the PMT on a regular basis.

1.2. SHAREPOINT PROCEDURE OVERVIEW

A. The CoM PMT is a system of consolidated Document & Form Libraries and Data Lists that assist in performing day to day functions of design/construction management while reducing the use of surface mail, email and email attachments.

1. Document libraries store a wide variety of documents in many different formats including but not limited to Word, Excel, PDF, photographs (all popular formats), etc.
2. Data Lists contain consolidated data information that can be generated and stored for further use. Punch Lists and Warranty issues will be examples of Data Lists.
3. Form Libraries are primarily used when a specific work flow process is needed. The form acts as the cover letter. An example of this would be the Submittal Review Process.
4. Libraries are controlled by Permission Groups and Permission Levels.

B. The following libraries and sub-libraries on the PMWS are provided for specific workflows and contract documentation. Related specification numbers are in "( )" if applicable.

Contract Documents	Construction Administration	Construction Progress	LEED Documentation	Quality Control	Construction Closeout
GC Partial Pay Apps (01 29 76)	*Change Order Requests (COR Form) (01 26 57)*	*Schedules (01 32 16)*	*LEED Documents*	*Regulatory Inspections*	*Misc Closeout Documents*
Construction Documents	*Change Orders (CO Form) (01 26 63)*	*Progress Meetings (01 31 19)*	*Waste Management (01 74 19)*	*Commissioning Checklists*	*O & M Manuals (01 78 23)*
Regulatory Documents	*Construction Bulletins (CB Form) (01 26 46)*	*Daily Journal (DJ Form) (01 32 26)*		*System Performance Tests*	*Product Warranties /Guarantees (01 78 36)*
Testing Contract	*Request for Information (RFI Form) (01 26 13)*			*Quality Management Observation (QMO Form) (01 45 16)*	*As-Builts (01 78 39)*
	Submittals (SUB Form) (01 33 23)			*Safety and Incident Reports*	*Attic Stock (01 78 23)*
	Substitution Request (SR Form) (01 25 13)			*Material Testing & Field Reports*	*Demonstration and Training (01 79 00)*

Contract Documents	Construction Administration	Construction Progress	LEED Documentation	Quality Control	Construction Closeout
					Warranty Issues (WI Form) *(01 78 23)*

C. A tutorial document on the web based PMT will be provided to the General Contractor (GC) who is awarded the contract. Additional training will be provided as needed for the GC and Sub-Contractors (SC) by the CoM.

D. The PMT has predefined work flows that channel automated alerts as documents are uploaded, reviewed, and completed. These workflows are designed for inbound information from the contractor as well as outbound information from the Architectural/Engineer consultant and the Owner.

E. The GC will be required to receive email notifications, access the internet to review related documentation and be able to upload/download documentation to the various project libraries.

F. The SC's will be required (at a minimum) to receive email notifications and access the internet to review related documentation. Prior to setting up the final PMT the GC and CPM shall meet to review all SP workflows, the GC will determine to what level over the minimum requirements the SC's will be involved.

1.3. RELATED SPECIFICATIONS

A. The following specification sections are directly related to the CoM PMT system.

1. 01 25 13 Product Substitution Procedures
2. 01 26 13 Request for Information (RFI)
3. 01 26 46 Construction Bulletins (CB)
4. 01 26 57 Change Order Request (COR)
5. 01 26 63 Change Order (CO)
6. 01 29 76 Progress Payment Procedures
7. 01 31 19 Project Meetings
8. 01 32 16 Construction Progress Schedules
9. 01 32 26 Construction Progress Reporting
10. 01 32 33 Photographic Documentation
11. 01 33 23 Submittals
12. 01 45 16 Field Quality Control Procedures (Owner)

PART 2 - PRODUCTS

2.1. SHAREPOINT SYSTEM RELATED PRODUCTS

A. SharePoint is a Microsoft Windows based software that requires no additional software installation, hardware or other special requirements/applications for the users. There are no costs associated with the use of this system.

B. Currently the CoM is using SharePoint 2010.

1. SharePoint works best if the user's computer is running Windows versions 7 through 8.1.
2. SharePoint works best when used with Internet Explorer versions 9 - 11 (32 bit).

a. At this time SharePoint is not compatible with other internet browsers such as Fire Fox, Google Chrome, and Safari.

PART 3 - EXECUTION

3.1. POST BID-OPENING

A. After bids have been opened, a successful bidder has been determined, and bid acceptance procedures have been initiated the City Project Manager (CPM) will contact the GC to provide the following information.

1. Project Management Software Tutorial. This tutorial is in a PDF printable format with screen shots and associated instructions on how to access and use the PMT.
   a. Tutorial instructions will include but not be limited to the following:
      i. Descriptions of various libraries, documents, and forms that will be used throughout the construction project.
      ii. Uploading procedures for various types of documents including standardized naming conventions.
2. A blank Project Directory in an Excel spread sheet format. The contractor shall provide the following information for GC and SC staffs as indicated on the spreadsheet. This will generally be the Project Manager for the GC as well as the Sub-contractors and the GC Site Supervisor.

a. Last Name, First Name
b. Company Name
c. Email address (valid, work related)
d. Work Phone Number (required, include area code)
e. Cell Phone Number (not required, include area code)

3. The GC shall provide the above information for all SC's where the GC is not self-performing the work.
4. The GC may provide project foreperson information for work being self-performed if he/she so desires.

3.2. POST PRE-CONSTRUCTION MEETING

A. The GCPM will return the completed Project Directory spread sheet to the CPM no later than the Pre-construction meeting.

B. The CPM is responsible for uploading all project directory data into SharePoint and coordinating with CoM Information Technology (CoM-IT) for creating the logins and passwords of non-city staff (GC/SC staffs).

C. All GC/SC staff will be notified through an automated email from CoM IT that logins and passwords are available. It is the responsibility of each GC/SC to call the CoM-IT number provided in the email to receive his/her login/password over the phone. Logins and passwords will not be released via email.

D. Once the GCPM has received his/her login/password uploading of contract related documents can begin. This would include but not be limited to project schedules, submittals, RFI's, and other documents as needed.

E. All workflows, review of documentation, and general archiving of construction related documentation will be conducted on the PMWS. These documents will generally not be emailed.

F. The following documents related to the execution of the contract will not be part of the PMWS:

1. All documentation related to executing the contract, such as:
   a. Sub Contractors list
   b. Affirmative Action documentation
   c. Bonding documentation
   d. Documentation associated with payroll verification
   e. Final documentation associated with closing out the contract
2. Any documentation required/generated by ordinance, code or statute, such as;
   a. Erosion Control inspections
   b. Building Inspection Department inspections

END OF SECTION

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SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULES

PART 1 – GENERAL

1.1. SCOPE

A. This specification is to identify various project related schedules associated with indicating construction progress and outlook. The following schedules are the responsibility of the General Contractor (GC).
   1. Overall Project Schedule
   2. 6 Week Look-out Schedule

B. This specification is not intended to include internal schedules generated by the contractors during their planning and execution of the contract.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 31 19 Progress Meetings
D. Section 01 74 13 Progress Cleaning
E. Section 01 77 00 Closeout Procedures
F. Section 01 78 23 Operation and Maintenance Data
G. Section 01 78 36 Warranties
H. Section 01 78 39 As-Built Drawings
I. Section 01 78 43 Spare Parts and Extra Materials
J. Section 01 79 00 Demonstration and Training
K. Section 01 91 00 Commissioning
L. Other specification within the construction documents that may indicate the need for scheduling any event with Owner, Project Architect, Owner Representatives, including any owner provided equipment.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. OVERALL PROJECT SCHEDULE (OPS)

A. The GC shall prepare an OPS that covers the duration of the contract from the pre-construction meeting through the end of construction to final contract closeout.
   1. The GC shall review Specification 01 77 00 Closeout Procedures to become familiar with definitions, differences, and requirements for closing out the construction and contract including the association with progress payments.

B. The GC shall provide copies and lead a discussion on the OPS during the pre-construction meeting.
C. The OPS shall indicate start and end dates of each task associated with the project.
D. The OPS shall clearly indicate the critical path of the project.
E. The GC shall update the OPS as often as necessary during the duration of the project. Updates will be briefed as needed during bi-weekly progress meetings.

3.2. 6 WEEK LOOK-OUT SCHEDULES (LOS)

A. The GC shall prepare the initial LOS to include detail of daily tasks for the first six (6) weeks of construction in depth for the Pre-construction meeting. The LOS shall be compatible and complimentary to the OPS.
B. The GC shall provide copies and lead a discussion on the LOS during the pre-construction meeting.

C. The LOS shall indicate start and end dates of each major task, associated related sub-tasks, and required parallel or pre-requisite tasks required to complete the major task on time.

D. The LOS shall also include identifying and scheduling such events as:

1. Pre-installation meetings and mock-up review meetings.
2. Quality management reviews of installations before they are covered.
3. Owner provided equipment as designated by the contract documents.
4. Work by others as designated by the contract documents.
5. Critical submittal dates.

E. The GC shall update the LOS prior to each bi-weekly progress meeting to indicate the next 6 weeks of scheduled work. Updates will be briefed during each bi-weekly progress meeting.

3.3. PROJECT MANAGEMENT WEB SITE (PMWS)

A. The GC shall upload all project schedules and updates to the PMWS in an original PDF version of the scheduling document. Scans will not be permitted.

END OF SECTION

SECTION 01 32 19
SUBMITTALS SCHEDULE

PART 1 – GENERAL

1.1. SUMMARY

A. The General Contractor shall submit a complete and comprehensive list of all submittals anticipated during the execution of this contract.

B. The GC shall include the Administrative submittals identified in item 1.5 below and shall be required to up load them to the Project Management Web Site.

C. The initial Submittals Schedule shall be based on the original contract documents used at the time of bidding and any posted addenda through awarding of the contract.

D. The Submittal Schedule may be appended during the execution of the contract based on amendments to the contract in the form of Change Orders, Construction Bulletins, and other related documents that add, or change the scope of the work.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 33 23 Submittals
D. Section 01 91 00 Commissioning

1.3. RELATED DOCUMENTS

A. The following documents shall be used as the basis for initiating the original Submittals Schedule.
   1. Drawing documents and specifications (including general provisions) as provided with the bid set documents and any published addenda.

B. The following documents shall be used to amend the submittals schedule as needed during the execution of this contract.
   1. Documents associated with revisions or clarifications to number A.1 above after awarding of the contract, including but not limited to:
      a. Construction Bulletins
      b. Approved Change Orders

1.4. SUBMITTAL DEFINITIONS

A. Administrative Submittal: Any submittal that may be required by a Division 1 Specification and as noted in Section 1.5 below.

B. Critical Path Submittal: Any early submittal that needs a priority review due to early construction use or long lead times where a delay could affect the critical path of the construction schedule

C. Submittal: Any material, product, equipment, or general requirement as outlined in this and other specifications that require a favorable review or acceptance prior to proceeding with procuring the item or proceeding with the Work.

1.5. SUBMITTAL REQUIREMENTS

A. The GC and all Sub-contractors shall review the construction documents including the specifications of their individual Division or Trade to compile a complete list of all materials, products, or equipment that will require a positively reviewed submittal to be completed prior to procurement and installation.
   1. Submittals shall include but not be limited to any of the following that may apply:
      a. Shop Drawings
      b. Product Data
      c. Assembly Drawings
      d. Engineered Drawings
      e. Product Samples

B. The following items will require an approved submittal, verify with specifications for specific needs and requirements:
   1. Contractor certifications for specialized work such as asbestos removal, well drilling, controls, AV, etc.

1.6. ADMINISTRATIVE SUBMITTALS

A. The GC shall upload the following submittals within 15 working days of receipt of the City of Madison Start Work Letter. All Administrative Submittals shall be approved prior to requesting Progress Payment Number 1.
   1. Contractors Project Directory, see specification 01 31 23, discuss requirements with CPM
   2. Schedule of Values, see Specification 01 29 73
   3. Submittals Schedule, see Specification 01 32 19
   4. Waste Management Plan, see Specification 01 74 19
   5. Closeout Requirement Checklist, see Specification 01 77 00
   6. Warranty Checklist, see Specification 01 78 36

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. OVERALL RESPONSIBILITIES OF ALL CONTRACTORS

A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work to provide a complete and comprehensive list of submittals to the General Contractor.

B. Each list shall indicate the title of the submittal, the associated specification of the submittal, whether the submittal can be considered an early/middle/late submittal, the anticipated date the submittal will be provided and the anticipated date the submittal needs to be approved.

C. Contractors shall be aware that the goals for submittal review by the Architect staff and City staff will be as follows:
   1. For items on the Critical Path as identified by the GC, five (5) working days
   2. For most other submittals ten (10) working days
   3. Additional time may be needed for complex submittals or if re-submittals are required.

D. The general format of the Submittal Schedule shall be tabular as per this example:

Title	Specification	Critical Path (Y or N)	Date provided	Date required	Remarks
Concrete Mix Design	03 30 00	Y	Oct 1, 2014	Oct 15, 2014	
Paint Draw Downs	09 90 00	N	Jan 2, 2015	Jan 20, 2015	

3.2. GENERAL CONTRACTORS RESPONSIBILITIES

A. The General Contractor shall be responsible for all of the following:
   1. Consolidating all submittal lists from individual contractors into one master list.
   2. Reviewing all submitted lists for completeness, timing with the overall contract, etc. The GC shall meet with individual contractors to make changes as necessary.
   3. Upload the completed Submittals Schedule to the Submittal Library on the Project Management Web Site for review as SD 003.0. See Specification 01 33 23 Submittals for more information on this procedure.
   4. Resubmit the schedule as needed after initial reviews have been completed.

B. The GC shall work with other contractors to amend the Submittals Schedule throughout the execution of the project based on changes and modifications as needed.

C. The GC and Project Architect shall be responsible for reviewing and briefing the submittal schedule and submittals status at each bi-weekly construction meeting.

3.3. STAFF REVIEW RESPONSIBILITIES

A. The Project Architect, consulting staff, Commissioning Agent (CxA), Owner, and city staff will review the Submittal Schedule for completeness per the plans and specifications within their divisions of work. The reviewing staff may provide comments as needed. Some examples might include the following:
   1. Submittal not required
   2. Provide photos of samples with digital submittal
   3. Insure one submittal for complete system
   4. Append the schedule to include…
   5. See Specification <xyz> for additional requirements

B. The Project Architect and City Project Manager will finalize review comments regarding the Submittal Schedule. Re-submittal of the submittal schedule may be required.

END OF SECTION

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SECTION 01 32 23
SURVEY AND LAYOUT DATA

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to set forth the minimal required guide lines to be followed by the General Contractor (GC) and the Land Surveyor (Surveyor) including but not limited to the following:
   1. Surveyor Professional Requirements
   2. Horizontal and Vertical Datum Control
   3. Local Control (if any)
   4. Electronic File and Data Requirements
   5. As-Built Documentation Requirements

B. When working on any City of Madison project, OSHA standards must be complied with. The Surveyor shall provide appropriate traffic control in accordance to the Manual on Uniform Traffic Control Devices (MUTCD).

C. The Surveyor shall be responsible for notifying Diggers Hotline in advance of beginning the field work for this contract.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site (SharePoint)
C. Section 01 33 23 Submittals
D. Section 01 78 39 As-Built Drawings
E. Section 105.9, Survey Points and Instructions, of the City of Madison Standard Specifications for Public Works

1.3. SURVEYOR QUALIFICATIONS

A. The General Contractors, Land Surveyor Sub-Contractor shall meet or exceed the following:
   1. The Principal Land Surveyor (PLS) shall be licensed to practice in the State of Wisconsin.
      a. The PLS's license shall be current at the beginning of the contract and the PLS shall maintain an active license throughout the execution of this contract.
   2. The PLS shall have a minimum of minimum of ten (10) years of field experience on similar projects of scope and size.
      a. Land Surveyors working under the direction of the PLS shall have a minimum of five (5) years of field experience on similar projects of scope and size.

B. The PLS shall be responsible for checking and verifying all work being performed under the PLS's direction during the execution of this contract. This shall include but not be limited to periodic field checks of equipment and survey data for accuracy and compliance with the contract documents.

1.4. QUALITY ASSURANCE

A. The PLS shall do all surveying in City of Madison Datum's as follows:
   1. All Horizontal Control shall be in the Dane County Coordinates (WISCRS), NAD 83(1997) datum, US Survey foot).
   2. All Vertical Control shall be in NAVD88(1991).

3. Information on PLSS Section Corner Monuments and Tie Sheets can be found on the City Engineering Mapping website http://gis.cityofmadison.com/Madison_PLSS/PLSS_TieSheets.html.

1.5. SUBMITTALS

A. After initial project setup the PLS shall provide the following information as a Survey Data Submittal for review by the CPM/CCM, and Owner. See Specification 01 33 23 – Submittals for more information.
   1. Copy of the PLS (and any supporting staff) current State of Wisconsin registration certificate/licenses.
   2. Digital Survey Submittal on a thumb drive delivered to the CPM/CCM. Submittal Survey shall be on a thumb drive or CD in Auto CAD 2017, MicroStation V8i, or DXF format. Digital Submittal shall be of the project site setup showing all of the following:
      a. Key features not scheduled for demolition, including but not limited to building corners, roof overhangs, and door locations.
      b. Location of construction limits fencing.
      c. Locations of PLSS and/or project control points provided by the Owner.
      d. Locations of project based control points.
   3. Printed Survey Submittal shall be the same as item 1 above in PDF format. PDF file shall be formatted to print to scale on 24"x36" sheets as required to show all features with text neatly organized for each item identified. When multiple sheets are used a match line and sheet references shall be required.
   4. PDF file of the complete level/layer scheme. Scheme shall be in tabular form formatted to 8.5 by 11 paper and shall include all of the following:
      a. Level/layer designation (abbreviation).
      b. Level/layer designation (full title).
      c. Feature attribute characteristics (line weight, line style, font, etc.).
      d. Cell attribute information
      e. Samples of line styles and cells.

1.6. EXAMINATION

A. The PLS shall be responsible for verifying all site data including the owner provided local control points (see Section 3.1 below) prior to starting the Work.
B. Notify the Project Architect and CPM/CCM immediately if any discrepancies are discovered.

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1. PRE-CONSTRUCTION OWNER SUPPORT

A. The CPM/CCM shall provide the GC/PLS with a digital CAD seed file on or before the Pre-construction meeting.
   1. Seed file shall be a MicroStation 3D seed file using the datum indicated above. Seed file shall be delivered as a MicroStation V8i or DXF format as requested by the PLS.
      a. Seed file shall be used as the PLS's initial base file for all future work on this contract.

3.2. UTILITY LOCATING

A. The GC and/or PLS shall be responsible for notifying Diggers Hotline for all utility locate requests.

3.3. SURVEY CONTROL AND LAYOUT DATA

A. The GC and PLS are responsible for all other survey control and layout data required to perform the work in this contract.

3.4. TOPOGRAPHIC SURVEYING

A. The Surveyor may perform the topographic survey with properly calibrated equipment as follows:
   1. Total station, achieving minimum accuracy for well-defined features of +/- 0.1 feet horizontal and +/-0.04 feet vertical at 95% confidence relative to control. "Well defined features" shall include but not be limited to property irons, pavements, trees, landscaping features, buildings, utility locations, and other permanent features.
   2. RTK GPS shall be permitted in large open areas, along tree lines, and in brushy areas.

3.5. SITE SURVEY AS-BUILT

A. See Specification 01 78 39 As-Built Drawings, Section 3.2 for more information on required record site information to be provided prior to contract closeout.

B. The GC shall be responsible for scheduling the PLS to capture locations and depths of all buried utilities prior to any contractor back filing trenches. The Owner may require missing information to be located and surveyed at the GC's expense.

END OF SECTION

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SECTION 01 32 26
CONSTRUCTION PROGRESS REPORTING

PART 1 – GENERAL

1.1. SUMMARY

A. Daily records of project activities, resources used, weather conditions, and other information related to the ongoing progress of the project are extremely important at all levels of Construction Management.

B. Daily records provide the base for weekly progress reports and updating progress schedules.

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 31 19 Project Meetings

B. Section 01 31 23 Project Management Web Site

C. Section 01 32 23 Photographic Documentation

1.3. PERFORMANCE AND QUALITY ASSURANCE REQUIREMENTS

A. The General Contractor (GC) shall be responsible for all Construction Progress Reporting as outlined in this and other specifications as noted.

B. The GC shall maintain daily progress journals in a format of his/her choosing provided it is legible and contains the information as outlined in Section3.1 below.

C. The journal shall be located in the job trailer and shall be reviewable by the Project Architect or City Project Manager if so requested.

PART 2 – PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. CONTRACTOR JOURNAL

A. The GC shall maintain a journal of daily progress on which Work is performed by any employee or entity for which the GC is responsible. Such reports shall include all relevant data concerning the progress of Work activities the GC and Subcontractors are responsible for and the effect of that activity on the time of performance of the Contract.

1. Some projects may not require weekly journals be kept instead of daily journals. This is at the sole discretion of the City Project Manager. A daily journal will generally be required when the contract has a significant amount of site work. A weekly journal will generally be used when a contract is interior work only.

B. Journal entries shall be made on the Contractor Daily/Weekly Report Form located in the Construction Progress-Daily Journal Library on the Project Management Web Site. The form consists of the following areas:

1. Weather; include temperature, humidity, precipitation, wind and other related information such as significant storm events, times, and details.
2. Work completed by trade
3. Delays encountered
4. Deliveries received or delayed
5. Hot issues that need to be addressed
6. Safety issues
7. Photograph progress and upload to the Photo Library on the Project Management Web Site.
8. Other including inspections, testing, etc.
9. Space for attaching documents

C. Contractor Daily/Weekly Report Forms shall be completed and signed by the GC's Job Superintendent or other on-site representative authorized by the GC confirming each such report is current, accurate and complete.

D. If applicable the GC shall include schedules of quantities and costs, progress schedules, wage rates, reports, estimates, invoices, records and other data as requested by the CPM concerning Work performed or to be performed under this Contract if the CPM determines such information is needed to substantiate Change Order proposals, claims, or to resolve disputes.

3.2. CONSTRUCTION PROGRESS MEETINGS

A. The GC shall provide a verbal summary of the previous two (2) weeks progress reports at each bi-weekly construction progress meeting.

END OF SECTION

SECTION 01 32 33
PHOTOGRAPHIC DOCUMENTATION

PART 1 – GENERAL

1.1. SCOPE

A. The General Contractor (GC) shall be required to take weekly digital photographs of interior and exterior construction progress and upload the photos directly to the Project Management Web Site (SharePoint).

B. The GC shall be required to provide digital time-lapse photo service of the project exterior construction progress.

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 29 76 Progress Payment Procedures

B. Section 01 31 23 Project Management Web Site (SharePoint)

C. Section 01 32 19 Submittals Schedule

D. Section 01 32 33 Submittals

E. Section 01 77 00 Closeout Procedures

1.3. SUBMITTALS

A. The GC shall provide general information on the type of camera being used for interior and exterior digital photographs.

1. Information may be written on Contractor's transmittal sheet.
   a. Include camera name/type, aspect ratio setting, and average file size
   b. Provide sample project pictures as part of PDF submittal.

B. The GC shall provide sufficient information on the type of time lapse system being used that meets the requirements identified in section 2.2 below.

PART 2 – PRODUCTS

2.1. DIGITAL CAMERA

A. All digital photographs shall be taken with a good quality digital camera, cell phone, tablet, and other such digital device.

B. Digital photographs shall be formatted to achieve a good, clear, and detailed image where the final file size is between 600 KB and 3.0 MB (3000KB).

2.1. TIME LAPSE CONSTRUCTION CAMERA (TLCC)

A. The TLCC shall be a high quality weather proof camera owned and operated, or leased, by the GC for the duration of this contract with the following minimum capabilities:

1. Pan-Tilt-Zoom (PTZ) capable.
2. Wireless internet or built in cellular technology capable.
   a. The use of memory cards will not be permitted.
3. Widescreen, high resolution (5-30 MP rating).
4. Powered by 120V AC.
   a. The use of battery packs will not be permitted.
5. Web/cloud hosted access to archived photos and video.
6. Provides complete time lapse video capability.
7. 24/7 service and support for equipment, software, and hosting services.

B. Approved equipment/services include but are not limited to the following:
   1. OxBlue Corporation, www.oxblue.com
   2. EarthCam, www.earthcam.net
   3. TrueLook, www.truelook.com

PART 3 – EXECUTION

3.1. REQUIREMENTS FOR DIGITAL PHOTOGRAPHS

A. The GC shall take a minimum of two (2) exterior photographs each week. Exterior photographs will not be required on projects that do not include any exterior work.
   1. Exterior photos shall be taken from approximately the same location each week for the duration of the project.
   2. When applicable this requirement shall begin prior to commencing any site work.
   3. This requirement shall only be applicable when there is exterior work actively being conducted with the project. Periods of inactivity due to weather (winter conditions) do not require a photograph.
   4. This requirement shall end when the exterior work has been substantially completed.
   5. This requirement may be suspended due to weather conditions or substantial delays in exterior progress.

B. The GC shall take interior photographs each week that document interior construction progress.
   1. This requirement will begin when exterior wall framing begins.
      a. When an interior remodeling project includes demolition work interior photos shall be taken during the demolition process.
   2. Pictures do not need to be taken from the same location each week.
   3. This requirement shall end when the interior work has been substantially completed.

C. Digital photographs shall be properly zoomed in/out, and flash used as needed, to capture a level of detail required to properly show the progress being captured by the photograph.
   1. Blurry and dark pictures will not be accepted.

D. The camera default naming convention is acceptable. The GC does not need to rename or specifically identify pictures with a title.

E. All digital photographs shall be saved in a JPEG (.jpg) format and uploaded directly to the SharePoint Project Images Library.
   1. The GC shall upload the photos to the folder that designates the appropriate construction week and date (beginning Monday date). If no folder exists, contact the CPM/CCM prior to uploading photos.

3.2. REQUIREMENTS FOR TIME LAPSE PHOTOGRAPHS

A. The GC shall be responsible for all of the following:
   1. Verify with the CPM/CCM a suitable place for mounting the camera and related equipment prior to installation.
   2. The complete installation, setup, maintenance, and removal of the camera and related equipment.
   3. The hosting and access of all photographs and videos taken by the camera during the project.
   4. Production of a final time lapse video (minimum of 3 minutes in length) of the project provided in a viewable format to the Owner on a thumb drive or CD.

B. Time lapse photos shall be taken from the same fixed position at approximately ten (10) minute intervals.
   1. Time lapse shall start before normal daily activities begin and end after normal daily activities have been completed.
      a. The GC shall adjust the camera time lapse schedule as needed to accommodate any periods of overtime or weekend work.
      b. Time lapse shall not be taken during major periods of no activity including night hours, holidays, weather related (winter) inactivity, etc.

C. All photos taken during the execution of this contract shall be accessible from a web based service. Archived photos shall be organized by date and time so that they can be easily retrieved and viewed as needed.
   1. If necessary the GC shall coordinate usernames and passwords for access to the photos. The City of Madison would prefer that the access be generic to accommodate a wide audience.

3.3. PROJECT MANAGEMENT WEB SITE (SHAREPOINT)

A. The CPM/CCM shall provide weekly progress folders in the Project Images Library on SharePoint.
   1. Progress folders are labeled with the Construction Week Number and the date for Monday of that week.
   2. The GC shall notify the CPM/CCM if additional weekly progress folders need to be created.

B. The GC shall upload the weekly digital photographs to the appropriate progress folder in the Project Images Library.

C. Copies of Time Lapse video shall be uploaded to a separate project folder in the Project Images Library prior to Construction Closeout.

END OF SECTION

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SECTION 01 33 20
ELECTRONIC MEDIA RELEASE STATEMENT

In accepting and utilizing any drawings, specification, or other data on any form of electronic media (the “Data”) generated and provided by Meyer, Scherer & Rockcastle, Ltd. (MSR) and its Consultants, the user covenants and agrees that all such drawings and data are instruments of service of Meyer, Scherer & Rockcastle, Ltd., and its Consultants, shall retain all common law, statutory law and other rights, including copyrights, and no transfer of rights is intended by this transmittal.

The Data is scaled but are not intended for use in construction. The electronic files submitted by MSR to the undersigned are submitted for use in preparing submittals for the project described above (“Project”) only. By accepting and using the Data, you agree to the terms set forth below.

The user further agrees not to use the Data, in whole or in part, for any client, purpose or project other than the Project. MSR and its Consultants are not liable for claims resulting in any way from unauthorized changes made by user or user’s reuse of the Data for any other project. User will indemnify and defend MSR and its Consultants from any damage, liability or cost, including reasonable attorneys’ fees, arising from any actions on user’s part that result in changes or reuse of the Data without the prior written consent of MSR.

The Data is provided without warranties of any kind, including express, implied or statutory warranties of fitness for a particular purpose, merchantability or non-infringement.

MSR and its Consultants take no responsibility for the Data’s compatibility with software or hardware used by the recipient. We recommend that the Data be screened for virus contamination prior to its use.
The user warrants that they have to authority to accept these terms on behalf of the use and MSR can rely upon said authority.

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SECTION 01 33 23
SUBMITTALS

PART 1 – GENERAL

1.1. SUMMARY

A. The General Contractor (GC) shall be responsible for providing submittals for review of all contractors and sub-contractors as designated in the construction documents. Submittals shall include but not be limited to all of the following:
   1. Equipment specified and pre-approved in the specification; to ensure quality, construction, and performance specifications have not changed since final design.
   2. Equipment specified by performance in the specification; to ensure that the intended quality, construction, and performance specified is met by the selected material or product.
   3. Shop, piece, erection, and other such drawings as indicated in the specifications to ensure all structural, dimensional, and assembly requirements are being met.
   4. Submittals indicating installation sequencing
   5. Submittals indicating control sequencing
   6. Contractor licensing, certification, and other such regulatory documentation when required by a specification.
   7. Other submittals as may be required by individual specifications.

B. The submittal process shall not be used to determine alternates to specified products or equipment. All considerations shall be reviewed during the bidding process and acceptable alternates shall be acknowledged by addendum prior to the closing of bidding. See bidding instructions for the information on submitting alternates for consideration.

D. In the event that a manufacturer has significantly changed a product (discontinued a model, changed dimension or performance data changed available colors, etc.) since bid opening the GC shall submit a Request for Information (RFI) to the Project Architect requesting other approved alternates prior to uploading a digital submittal.

E. Contractors and sub-contractors shall be responsible for knowing the submittal requirements of ALL sections within their scope of work under the contract. The Owner reserves the right to request documentation on any materials, equipment, or product being installed where a submittal is not on file. If the material, equipment, or product installed is determined not to meet the intent of the specification the contractor/sub-contractor shall be required to remove and replace the items involved. The GC shall be solely responsible for all costs associated with the removal and replacement.

1.2. RELATED REFERENCES

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 32 19 Submittals Schedule
D. Section 01 32 26 Construction Progress Reporting
E. Section 01 91 00 Commissioning
F. All Technical Specifications, contract documents, construction drawings, and any published addendums during the bidding process.
G. All contract documents generated during the execution of the contract including but not limited to Requests for Information (RFI) and Construction Bulletins (CB).

1.3. SUBMITTAL REQUIREMENTS

A. A completed submittal shall meet the following requirements:

1. Digital submittal shall be original PDF of manufacturer's data sheets or high quality color scan of the same.
    a. Submittals shall not include sales fliers or other similar documents that typically do not provide complete manufacturers data.
2. Documents within the PDF submittal shall be printable to a sized sheet no less than 8-1/2 by 11 inches and no larger than 24 by 36 inches.
3. At the beginning of each submittal the contractor shall identify the plan reference (WC-1, EF-3, etc.) in RED block letters that the submittal is for.
4. Where multiple model numbers appear in a table the contractor shall identify the specific model being submitted by using a RED square, box, or other designation to distinguish the correct model from others on the page.

B. A complete submittal will include all information associated with the product or equipment as presented in plans, equipment tables, and specifications. Information shall include but not be limited to the following:
1. Dimensional data
2. Performance data
3. Resource requirements, power, water, waste, etc
4. Clearance and maintenance requirements
5. Finish information, colors, textures, etc.
6. Warranty information

C. Where a submittal includes material samples (carpet, tile, paint draw downs, etc.) the contractor shall do the following:
1. The Contractor shall submit the sample(s) as indicated in the specification.
2. The Contractor shall include a quality photograph(s) of the product with the digital submittal. Photographs shall meet the following requirements:
    a. Formatted to be between 500Kb and 1.0 Mb in file size
    b. Have no glare or flash reflection on the sample
    c. Sample fills the frame of the photo and shows detail as needed. Include multiple photos from other angles as needed.
    d. Scanned copies of products or photos are not acceptable.

D. Uploaded submittals should be relative and related to a specific written specification.
1. Do not upload submittals under a broad category or division (I.E. HVAC 23 00 00). Always upload by the specific specification that identifies a required product or performance to be met.
2. Group related items together if the specification is written that way. (I.E. all of the plumbing fixtures and trim relative to one specific specification should be submitted together).
3. Submittals shall be grouped and adhere to the divisions in the submittal schedule. Submittals that do not conform to the submittal schedule and/or specification divisions will be rejected for re-submittal.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL CONTRACTORS PROCEDURES

A. All required submittals will be uploaded to the Construction Administration-Submittal Drawings Library on the Project Management Web Site (PMWS) by the GC.
1. The GC shall open a new Submittal Form in the Submittals Drawings Library for each required submittal from the Submittals schedule.
2. Fill in required information on the form that will be used for routing the review and comments.
3. Attach all documentation as described in Section 1.3 above.
    a. Submit samples under separate cover to the Project Architect when necessary.

B. Uploading the submittal indicates that the GC has reviewed and approved the submittal against the contract document requirements.

C. The GC shall discuss submittal status at all progress meetings and shall monitor submittal review/approval/re-submittal so as to not incur delays in the project schedule.

D. A completed upload of the submittal to the PMWS initiates the review process workflow.

E. The GC and sub-contractors shall provide re-submittals as required.

3.2. SUBMITTAL REVIEW

A. Upon completion of the submittal upload by the GC the PMWS automatically notifies the appropriate Architect/Engineer and Owner Representative, including CxA, by Division/Specification number that there is a submittal for review.

B. The submittal shall be reviewed internally by the required Architect/Engineer and Owner Representative and CxA in a timely fashion and provide commentary on missing items, incorrect information, or incomplete shop drawings, etc as needed.

C. When the internal review is completed the PMWS will notify the Project Architect the submittal is ready for final review.

3.3. PROJECT ARCHITECTS REVIEW

A. Upon completion of the internal review the Project Architect shall review all internal review comments, confer with the CPM and CxA as needed and determine the appropriate disposition status for the submittal (approved or resubmit).

C. The Project Architect shall summarize final internal review comments onto the submittal cover sheet, provide a final disposition of the submittal and update the review status of the submittal to "Complete…" (with or w/o comments) or "Rejected".

D. A completed Final Review status initiates the PMWS to notify the GC and appropriate sub-contractor(s) that the review of the submittal has been completed.

END OF SECTION

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SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.
2. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.
3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1.4 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional currently licensed in the State of Wisconsin, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
   1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
   2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

C. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, telephone number, and email address of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Statement on condition of substrates and their acceptability for installation of product.
   2. Statement that products at Project site comply with requirements.
   3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   5. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
   1. Statement that equipment complies with requirements.
   2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   3. Other required items indicated in individual Specification Sections.

1.8 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who

is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor responsibilities include the following:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
      d. When testing is complete, remove test specimens and test assemblies, mockups (unless indicated to be part of the final work), and laboratory mockups; do not reuse products on Project.
   2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   1. Refer to Section 01 43 39 – Mockups for additional requirements.
   2. Build mockups of size indicated.
   3. Build mockups in location indicated or, if not indicated, as directed by Architect or Owner.
   4. Notify Architect and Owner seven days in advance of dates and times when mockups will be constructed.
   5. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
   6. Demonstrate the proposed range of aesthetic effects and workmanship.
   7. Obtain Architect's and Owner's approval of mockups before starting corresponding work, fabrication, or construction.
      a. Allow seven days for initial review and each re-review of each mockup.
   8. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   9. Demolish and remove mockups when directed unless otherwise indicated.

L. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.9 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
   2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
   1. Refer to Section 01 45 16 – Field Quality Control Procedures for additional requirements.
   2. Engage a qualified testing agency to perform quality-control services.
      a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   3. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspection will be performed.
   4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority, Owner and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Architect, Commissioning Authority, Owner and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
   4. Facilities for storage and field curing of test samples.
   5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
   6. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
   1. Refer to Section 01 45 29 – Testing Laboratory Services for additional requirements.
   2. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
   3. Notifying Architect, Commissioning Authority, Owner, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   4. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority, through Owner with copy to Contractor and to authorities having jurisdiction.
   5. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
   6. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   7. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Architect.
   4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's, and Owner's reference during normal working hours.
   1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.

7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.abma.com.
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; http://www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWPA - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.

65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA - Electronic Components Industry Association; www.eciaonline.org.
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; www.eima.com.
76. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; www.evo-world.org.
80. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
83. FM Approvals - FM Approvals LLC; www.fmglobal.com.
84. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.
86. FSA - Fluid Sealing Association; www.fluidsealing.com.
87. FSC - Forest Stewardship Council U.S.; www.fscus.org.
88. GA - Gypsum Association; www.gypsum.org.
89. GANA - Glass Association of North America; www.glasswebsite.com.
90. GS - Green Seal; www.greenseal.org.
91. HI - Hydraulic Institute; www.pumps.org.
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
94. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
95. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
96. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
97. IAS - International Accreditation Service; www.iasonline.org.
98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
100. ICC - International Code Council; www.iccsafe.org.
101. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
102. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
103. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
104. IEC - International Electrotechnical Commission; www.iec.ch.
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
109. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
110. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
111. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
116. ISO - International Organization for Standardization; www.iso.org.
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; www.itu.int/home.
119. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
120. LMA - Laminating Materials Association; (See CPA).

121. LPI - Lightning Protection Institute; www.lightning.org.
122. MBMA - Metal Building Manufacturers Association; www.mbma.com.
123. MCA - Metal Construction Association; www.metalconstruction.org.
124. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
125. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
126. MHIA - Material Handling Industry of America; www.mhia.org.
127. MIA - Marble Institute of America; www.mhia.org.
128. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
129. MPI - Master Painters Institute; www.paintinfo.com.
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
131. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
132. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
133. NADCA - National Air Duct Cleaners Association; www.nadca.com.
134. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
135. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
136. NBI - New Buildings Institute; www.newbuildings.org.
137. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
138. NCMA - National Concrete Masonry Association; www.ncma.org.
139. NEBB - National Environmental Balancing Bureau; www.nebb.org.
140. NECA - National Electrical Contractors Association; www.necanet.org.
141. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
142. NEMA - National Electrical Manufacturers Association; www.nema.org.
143. NETA - InterNational Electrical Testing Association; www.netaworld.org.
144. NFHS - National Federation of State High School Associations; www.nfhs.org.
145. NFPA - National Fire Protection Association; www.nfpa.org.
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; www.nfrc.org.
148. NHLA - National Hardwood Lumber Association; www.nhla.com.
149. NLGA - National Lumber Grades Authority; www.nlga.org.
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
152. NRCA - National Roofing Contractors Association; www.nrca.net.
153. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
154. NSF - NSF International; www.nsf.org.
155. NSPE - National Society of Professional Engineers; www.nspe.org.
156. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
158. NWFA - National Wood Flooring Association; www.nwfa.org.
159. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
160. PDI - Plumbing & Drainage Institute; www.pdionline.org.
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
162. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
163. RFCI - Resilient Floor Covering Institute; www.rfci.com.
164. RIS - Redwood Inspection Service; www.redwoodinspection.com.
165. SAE - SAE International; www.sae.org.
166. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
167. SDI - Steel Deck Institute; www.sdi.org.
168. SDI - Steel Door Institute; www.steeldoor.org.
169. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; www.siaonline.org.
172. SJI - Steel Joist Institute; www.steeljoist.org.
173. SMA - Screen Manufacturers Association; www.smainfo.org.
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
175. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
176. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
177. SPIB - Southern Pine Inspection Bureau; www.spib.org.
178. SPRI - Single Ply Roofing Industry; www.spri.org.
179. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.

180. SSINA - Specialty Steel Industry of North America; www.ssina.com.
181. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
182. STI - Steel Tank Institute; www.steeltank.com.
183. SWI - Steel Window Institute; www.steelwindows.com.
184. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
185. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
186. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TMS - The Masonry Society; www.masonrysociety.org.
191. TPI - Truss Plate Institute; www.tpinst.org.
192. TPI - Turfgrass Producers International; www.turfgrasssod.org.
193. TRI - Tile Roofing Institute; www.tileroofing.org.
194. UL - Underwriters Laboratories Inc.; www.ul.com.
195. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
196. USAV - USA Volleyball; www.usavolleyball.org.
197. USGBC - U.S. Green Building Council; www.usgbc.org.
198. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
199. WASTEC - Waste Equipment Technology Association; www.wastec.org.
200. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
201. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
202. WDMA - Window & Door Manufacturers Association; www.wdma.com.
203. WI - Woodwork Institute; www.wicnet.org.
204. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
205. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.
1. CFR - Code of Federal Regulations; Available from Government Printing Office;

www.gpo.gov/fdsys.

2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
   a. Available from Defense Standardization Program; www.dsp.dla.mil.
   b. Available from General Services Administration; www.gsa.gov.
   c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 43 39
MOCKUPS

PART 1 – GENERAL

1.1. SUMMARY

A. Definition
   1. Mockups are field samples constructed, applied, or assembled at the project site for review by the Owner, Owners Representative, Architect and Consultants.
   2. Mockups are three dimensional, true scale models that illustrate materials and methods, equipment, workmanship, or location; based on plans, details, and assemblies.

B. Approved mockups establish the standard of quality by which the final work will be judged.

C. Approved mockups shall be properly documented and entered Into the Submittal Library on the Project Management Web Site like any other required submittal. See section 3.4 below for more information.

1.2. RELATED SPECIFICATIONS

A.	Section 01 26 13	Request for Information (RFI)
B.	Section 01 26 46	Change Bulletin (CB)
C.	Section 01 26 63	Change Order (CO)
D.	Section 01 31 19	Project Meetings
E.	Section 01 32 16	Construction Progress Schedules
F.	Section 01 33 23	Submittals
G.	Section 01 45 00	Quality Control

1.3. RELATED DOCUMENTS

A. The following documents shall be used for preparing mockups.
   1. All plans, specifications, and details including those derived as revisions (RFI, CB, CO).
   2. Construction Progress Schedules. Mockups shall be done and completed in a timely fashion for review and approval so as to not impact the Contractors project schedule.
   3. Any Manufacturers installation/assembly instructions.

1.4. PERFORMANCE REQUIREMENTS

A. All Contractors shall be responsible for providing and constructing mockups as specified in their Division of Work in the plans and specifications.

B. Materials to be used shall be as specified in the construction documents, full sized and properly assembled.

C. Completed mockups shall be of sufficient size to provide visible detail of all components as needed for the sample.

1.5. QUALITY ASSURANCE

A. The General Contractor (GC) shall be responsible for coordinating all of the following as needed:
   1. Designating the location for the mockup construction
   2. Coordinating the work of all contractors and materials required to complete the mockup
   3. Ensuring that the mockup meets the intent of the construction documents before scheduling the mockup review meeting.

PART 2 - PRODUCTS

2.1. MATERIALS

A. The materials used in mockups shall be only those materials indicated in the plans, specifications, and favorably reviewed submittals.

B. Mockups shall be made of full scale materials as delivered to the project site.

C. All materials associated with a particular detail, construction method, manufacturer's installation instructions shall be properly represented and visible in the mockup. This includes but is not limited to finished mortar joints, sealants, backer rods, tie bars, rebar, etc.

PART 3 - EXECUTION

3.1. REVIEW THE PLANS AND SPECIFICATIONS

A. The GC shall review the plans and specifications with all required contractors prior to constructing the mockup.

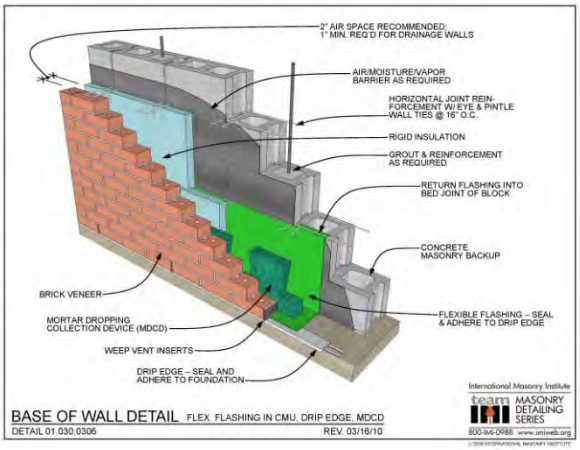
1. Mockups that will be built and remain in place, if favorably reviewed, will be installed in an area easily accessible for review.
2. Mockups that will not be built in place or will not remain will be constructed in a space on the project site protected from weather, construction traffic, and other such disturbances until such time as the associated work has been completed.
3. Insure all products being represented in the mockup meet the plans, specifications, and any published changes.

3.2. MOCKUP CONSTRUCTION

A. Mockups shall be of sufficient size to show various material adjacencies, connectivity, patterns, and other such related features.

B. Mockups shall be constructed in a layered fashion so that all products being used can be seen and evaluated.

C. The construction detail below is an example of a properly layered mockup.



D. Mockups:

1. Integrated Window Shade Awning CNPY-1 (5/A201, 9/A651, 8/A653)

Contractor shall Provide In-Place Mock-up of Curtainwall Awning, demonstrating execution of delegated design to satisfy intent described in Contract Documents.

2. EIFS-2 Infill and Finish (5/A201, 4/A404)

Contractor shall demonstrate technique for infilling openings in Existing EIFS walls with New EIFS-2. Mockup shall include full system install and demonstrate technique for prepping adjacent areas for feathering and floating of new finish system to achieve seamless transition between new and existing EIFS-1. Owner and Architect will review to establish approved standard of Execution for balance of EIFS Infill work.

Mockup to occur on one area that faces East, South, or West.

3. Existing EIFS Replacement and new EIFS-1 (5/A201 4/A404)

Contractor shall cut out full height and width area of existing EIFS. Contractor shall prep substrate and install all components of new EIFS-1 system. Installation shall include all base and transition flashing and be representative of a complete and finished installation. Owner and Architect will review to establish approved standard of execution for balance of EIFS replacement work.

Mockup to occur on one area that faces East, South, or West.

4. Existing EIFS Repair (Locations to be Determined)

GC, EIFS Installer, Owner and Architect shall identify location where existing EIFS finish to remain demonstrates defects such as:

a. Cracks
b. Minor Dents (Superficial, Not through Mesh)
c. Major Dents (Through Mesh)
d. Delamination of Mesh and Finish Coat
e. Moisture Damage

Locations selected should be low visibility if possible, GC shall demonstrate approach for performing the repair of existing EIFS to remain in preparation of application of new COAT-1A/B. Owner and Architect shall review locations to establish approved standard of execution for balance of EIFS repair work

5. Custom PT-4 Floor Pattern (3/A521)

In Place Mockup. Contractor shall provide in-place mock up demonstrating technique, application and final finish PT-4 over existing Epoxy Floors. Mockup shall be located at area of floor which will be eventually covered with carpet and shall demonstrate both field color paint and accent lines and pattern. Owner and Architect will review to establish approved standard of execution for balance of custom floor pattern work.

6. EPOXY-1 Patching (1/A701N)

In-Place Mockup. Contractor shall provide in-place mockup demonstrating technique for preparing substrate and surrounding existing epoxy for visually consistent and seamless installation of EPOXY-1 and transition to existing resinous flooring finish. Owner and Architect shall review locations to establish approved standard of execution for balance of EPOXY-1 patch and infill work

7. Slab Rehabilitation (EPOXY-2) and Floor Finish (EPOXY-1) (1/A701S)

In-Place Mockup. Contractor shall prepare a portion of heavily deteriorated concrete slab per the requirements of Specifications Section 03 01 30, providing appropriate grinding, hammering, or other means of slab surface modification, as well as infill with high-build epoxy mortar to achieve a suitable substrate for representative installation of new EPOXY-1 finish. Mockup will demonstrate achievement of a proper substrate as req'd per Section 09 67 23 and shall demonstrate a clean and visually consistent application of final EPOXY-1 finish. Owner and Architect will review to establish approved standard of execution for balance of slab remediation and refinishing work.

8. PT-7 Finish on AESS and MTLPNL-1 (1/A121N)

In-Place Mockup. Contractor shall apply PT-7 to full scale portion of Architecturally Exposed Structural Steel Canopy and MTLPNL-1 ceiling panel to demonstrate an outcome consistent with approved finished samples. Owner and Architect will review to establish approved standard of execution for balance of PT-7 applications.

9. Canopy Assembly - 1 (1/A121N, 3/A121N)

In-Place Mockup. Contractor shall prepare one standard 'Module' of Canopy 2 and all related elements to demonstrate typical fit and finish and integration of all relevant components. Including but not limited to:

a. MTLPNL-1 ceiling Panel
b. STRUT-__ Framing and configuration
c. Vendor Signs
d. Typical Fastener types and spacing
e. Fire Sprinkler integration
f. Lighting Integration
g. Miscellaneous blocking
h. Routing of electrical, data, and other miscellaneous services present.

Mockup shall be full extent of module described in enlarged detail. Owner and Architect will review to establish approved standard of execution for balance of Canopy areas with MTLPNL-1 soffit finishes.

1
2

10. Canopy Assembly – 2 (1/A121N, 4/A121N)

In-Place Mockup. Contractor shall prepare one standard 'Module' of Canopy 3 and all related elements to demonstrate typical fit and finish and integration of all relevant components. Including but not limited to:

a. ACRYLIC-1 ceiling Panel
b. STRUT-__ Framing and configuration
c. Vendor Signs
d. Typical Fastener types and spacing
e. Fire Sprinkler integration
f. Lighting Integration
g. Miscellaneous blocking
h. Routing of electrical, data, and other miscellaneous services present.

Mockup shall be full extent of module described in enlarged detail. Owner and Architect will review to establish approved standard of execution for balance of Canopy areas with ACRYLIC-1 soffit finishes.

3.3. MOCKUP REVIEW

A. The General Contractor and all associated Sub-contractors (Contracting Team) shall meet with the Owner, Owners Representative, Architect and Consultants (Design Team) as necessary to review the mock-up. Contractors shall be prepared to answer questions on materials and methods as necessary.

B. The Contracting and Design Teams shall review the mockup in detail for materials, methods, and workmanship with respect to the intent of the contract documents. Improvements or adjustments shall be discussed as needed.

C. If the mockup is incomplete or does not show sufficient detail of products and workmanship the General Contractor shall resubmit a new mockup.

D. Re-submittal of mockups to meet the intent of the contract documents shall be the responsibility of the General Contractor. No Change Orders will be processed for additional time or materials associated with re-submitting a mockup for approval.

1. In the event that a submitted mockup meets the criteria of the contract documents but does not meet the expectations of the design team and alternative methods or materials are discussed the following procedure shall be used:
   a. Project Architect shall publish a Construction Bulletin (CB) to detail the required/recommended changes.
   b. The GC shall prepare and submit a new mockup.

3.4. FINAL SUBMITTAL

A. The field approved mockup shall be submitted by the General Contractor as any other submittal for project documentation purposes. The mockup submittal shall consist of the following:

1. Digitally photograph the field approved mockup. Take as many detailed photos as necessary to capture the complexity of the mockup.
2. Provide a written summary of the approved mockup. Include all recommended adjustments, level of expected workmanship, and other such detail as discussed during the mockup review.
3. Submit the mockup to the Project Management Web Site. See Specification 01 33 23 Submittals for additional information.

END OF SECTION

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SECTION 01 45 16
FIELD QUALITY CONTROL PROCEDURES

PART 1 – GENERAL

1.1. SUMMARY

A. The City of Madison has developed a multi-faceted Quality Management Program that begins with contract signing and runs through contract closeout to ensure the best quality materials, workmanship, and product are delivered for the contracted Work.
   1. The Progress Management Web Site is a Construction Management tool that provides contractors and staff a single on-line location for the daily operations and progression of the Work.
   2. The Quality Management Observation (QMO) is an ongoing observation of the construction process as it progresses. The City of Madison does not use a “Punch List” or “Corrections List” as it is typically known throughout the construction industry. The QMO process acts as an “in progress punch list”.
      a. By using the QMO process the City of Madison’s goal is to have a zero item punch list prior to the 90% progress payment and owner occupancy.

B. All contractors shall be required to review the specifications identified in Section 1.2 below, and other related specifications identified therein to become familiar with the terminology and expectations of this City of Madison Public Works contract.

C. It is the intent of this specification to outline the requirements, expectations, and responsibilities of the General Contractor (GC), Project Architect, and other representatives of the Owner for items of Quality Assurance and Quality Control.
   1. This specification is not intended to conflict with Specification 01 40 00 Quality Requirements or other specifications requiring testing and inspecting services.
   2. This specification does not relieve the GC from any requirements associated with regulatory inspections performed by the City of Madison Building Inspection Unit, or inspectors from other agencies as required by code.
   3. Any testing performed by an Owner’s Representative does not relieve the GC from performing any testing that may required by the construction documents.

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 29 76 Progress Payment Procedures
C. Section 01 31 13 Project Coordination
D. Section 01 31 23 Project Management Web Site
E. Section 01 40 00 Quality Requirements
F. Section 01 77 00 Closeout Procedures
G. Section 01 78 13 Completion and Correction List
H. Section 01 91 00 Commissioning

1.3. PERFORMANCE REQUIREMENTS

A. All contractors shall be responsible for a proper quality assurance/quality control (QA/QC) program throughout the execution of the Work defined within the construction documents, including all recognized construction industry standards and all applicable regulatory codes.

B. The GC shall be responsible for all of the following:
   1. Monitor the quality of all workmanship, supplies, materials, and products being installed by all contractors and installers to ensure they meet or exceed the minimum requirements set forth by the construction documents.
   2. Submit a Request for Information (RFI) whenever manufacturers' instructions or referenced standards conflict with the construction documents before proceeding with the Work.
   3. Ensure that Work requiring special certifications or licensing is being performed by is being performed and supervised by personnel that meet the appropriate requirements.
      a. Ensure that all certificates and licenses are current throughout the execution of the project.

C. The CoM and its representatives shall perform quality assurance and quality control activities throughout the execution of this project. This in no way relieves the GC of maintaining an acceptable QA/QC program. =

1.4. QUALITY ASSURANCE

A. The GC shall be responsible for the following:
   1. All materials, equipment, and products shall be new, clean, undamaged, and meet the performance specifications defined within the construction documents including favorably reviewed submittals.
      a. Any material, equipment, or product that does not meet the requirements of the construction documents shall be removed and replaced, including any adjacent and related work, at the GCs expense.
   2. All Work shall be performed by persons properly trained and/or qualified to produce workmanship of the quality specified in the construction documents.
   3. Providing access to updated as-builts, addenda, submittals, bulletins and other related construction documents at the project site.

B. The CoM and its representatives may be responsible for any of the following:
   1. Attend pre-installation meetings
   2. Attend construction progress meetings
   3. Review all submittals
   4. Conduct field visits for QA/QC purposes, provide feedback to the GC and sub-contractors using Quality Management Observation (QMO) reports.
   5. Review delivered equipment
   6. Witness equipment installations, startups, testing as specified in other specifications

1.5. QUALITY MANAGEMENT OBSERVATION REPORT

A. The Quality Management Observation report or QMO is used as a QA/QC tool by those entities responsible for QA/QC activities, including but not limited to, the GC, CoM, PA, CX agent, etc.

B. QMOs are designed to be an early observation of non-conforming construction work before it becomes buried by follow on work. As such it is most often used as an "in progress punch list".

C. QMO forms are part of the Quality Control Library on the Project Management Web Site.

PART 2 – PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. QUALITY MANAGEMENT RESPONSIBILITIES

A. While making routine progress visits to the construction project the GC, CPM, CxA and A/E, and applicable others shall observe the details of the construction and installations to ensure that the intent of the construction documents is being followed.

B. If during the progress visit there is a determination of contract non-conformance a QMO report shall be initiated to begin the documentation process.
   1. The GC field superintendent shall be informed immediately of any issue that may cause harm, damage to finished work, or be buried prior to properly filing a QMO report.

C. The following information when filing a QMO report:
   1. Open a QMO report in the Quality Control Library on the Project Management Web Site
   2. Enter the date and time of the field visit
   2. Provide references to construction documents if any (examples; specification, drawing page, details, approved submittals, RFI, CB, etc)
   3. Provide a short title for the observation being made
   4. Provide a detailed description of the observation being made

5. Select all categories (Sitework, Structure, Enclosure, Interior, etc) from the given list that may apply to the observation being reported.
    a. For each category selected additional boxes shall open with contractor names associated with each category.
6. Select all contractors from the lists provided that may need to be aware of the observation.
7. Provide any attachments that may help provide reference to the observation.
8. Click the SAVE button before closing the form.

D. The software for the Project Management Website will email notifications that a QMO report has been initiated. The software will automatically select and notify the following:
1. The GC, PA, and CPM for all observation reports being filed.
2. Others depending on the observation categories selected.
3. Contractors based on the selections made in the sub-contractors lists.

3.2. RESPONDING TO A QMO

A. All contractors receiving email notification of a QMO Observation shall review the details of the observation.
B. The GC shall be responsible for determining the course of action required to remedy the non-conforming issue and shall coordinate and direct the contractor(s) responsible for any work related to the observation.
C. All contractors assigned to remedy the observation by the GC shall provide follow-up responses on the QMO report as follows:
1. Open the QMO report in the Quality Control Library on the Project Management Web Site.
2. In the "Follow-Up Response" area enter a description of your follow-up response in the box provided.
    a. Click "Insert Item" if additional boxes are required.
3. Add attachments (pictures) if needed to show the work has been completed.
4. Click the SAVE button before closing the form.

3.3. GENERAL CONTRACTORS FOLLOW-UP

A. The GC shall inspect the work to ensure that all assigned contractors have remedied the observation to the intent of the construction documents.
B. The GC shall respond with any additional comments in his/her response box.
1. If no comments are to be made the GC at a minimum must date the response box to trigger the next work flow.
C. Click the SAVE button before closing the form.
D. The software will email a notification to the CPM and the person who initiated the QMO that the issue has been remedied.

3.4. QMO CLOSEOUT PROCEDURE

A. The person who initiated the QMO shall review the remedied work and if properly corrected shall close and date the QMO form.
1. Click SAVE and the software will email a notification to the CPM that final review of the Observation is required.
2. In the event there are still issues the Quality Manager can add additional comments in the response area, click SAVE and re-issue the QMO for additional review as needed.
B. Once the person who initiated the QMO has closed the item the CPM shall review and verify with the PA that the Observation has been properly remedied and provide final closure on the QMO.

3.5. CONSTRUCTION CLOSEOUT

A. The GC shall note that successful close out QMOs are required for construction closeout as follows:
1. Certain progress payments as identified in Specification 01 29 76 are contingent QMO reports being properly closed out.
2. Specification 01 77 00 defines all construction closeout requirements.

END OF SECTION

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.1. REQUIREMENTS INCLUDED

A. The Contractor shall employ and pay for the services of an independent testing laboratory to perform specified services and testing.

B. Testing Laboratory inspection, sampling and testing is required for:

1. Section 03 30 00: Cast-In-Place Concrete
2. Section 05 12 00: Structural Steel Framing
3. Section 05 40 00: Cold-Formed Steel Framing
4. Section 31 20 00: Earthwork

1.2. RELATED REQUIREMENTS

A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.

B. Related Requirements Specified in Other Sections:

1. Division 22 and 23: Testing of Mechanical Systems
2. Division 26: Testing of Electrical Systems

1.3. QUALIFICATION OF LABORATORY

A. Meet "Recommended Requirements of Independent Laboratory Qualification" published by American Council of Independent Laboratories.

B. Meet basic requirements of ASTM E 329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."

C. Authorized to operate in State in which the Project is located.

1.4. LABORATORY DUTIES

A. Cooperate with Owner, A/E and Contractor; provide qualified personnel after due notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards.
2. Ascertain compliance of materials with requirements of Contract Documents.

C. Promptly notify the Owner, A/E and Contractor of observed irregularities or deficiencies of work or products.

D. Promptly submit written report of each test and inspection; one copy each to A/E, Consulting Engineer, Owner and Contractor. Each report shall include:

1. Date issued.
2. Project Title and number.
3. Testing laboratory name, address and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Record of temperature and weather conditions.
7. Date of test.
8. Identification of product and specification section.
9. Location of sample or test in the Project.
10. Type of inspection or test.
11. Results of tests and compliance with Contract Documents.

12. Interpretation of test results, when requested by A/E or the Contractor.

E. Perform additional tests as required by Owner, A/E or the Contractor.

1.5. LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Approve or accept any portions of the Work other than those portions of the Work scheduled for testing.
3. Perform any duties of the Contractor.

1.6. CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel, provide access to Work and to manufacturer's operations.

B. Secure and deliver to the laboratory, adequate quantities of representative samples of materials proposed to be used and which require testing. Submit concrete mix designs to A/E for approval prior to pouring concrete.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes that require control by the testing laboratory.

D. Furnish copies of Product test reports as required.

E. Furnish incidental labor and facilities:
1. To provide access to Work to be tested.
2. To obtain and handle samples at the Project site or at the source of the product to be tested.
3. To facilitate inspections and tests.
4. For storage and curing of test samples.

F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

G. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.

H. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate work does not comply with Contract Documents.

I. Temporarily halt the progress of the Work when tested materials do not comply with Contract Documents and promptly notify the Owner or his designated representative and A/E.

J. Remove and replace at no cost to the Owner, all defective materials discovered upon testing not to comply with Contract Documents, including cost for retesting and re-inspecting replaced Work that failed to comply with the Contract Documents.

1.7. SPECIFIC TEST, INSPECTIONS, AND METHODS REQUIRED

A. **Section 03 30 00: Cast-In-Place Concrete**
1. Secure sample of aggregates Contractor proposes to use and test for compliance with Specifications.
2. Certify compliance with Specifications of cement proposed for use by the Contractor.
3. Review and approve the Contractor's proposed concrete mix proportions for the required concrete strengths using materials Contractor proposed to use on the project. Incorporate specified admixtures and not less than amounts of cement specified.
4. Perform appropriate laboratory tests, including compression tests of cylinders and slump test to substantiate mix designs.
5. Inspect and test materials during concrete work to substantiate compliance with Specifications and mix requirements.
a. Testing:
i. Sample and test concrete in accordance with ASTM C 31, ASTM C 143, ASTM C 172, and ASTM C 231.
ii. Perform slump tests in accord with ASTM C 143 from same concrete batch used for test cylinders and record results and comments on compression test reports.
iii. Perform compression tests in accordance with ASTM C39.
iv. When air-entrained concrete is used, a minimum of one (1) air content test shall be performed in accordance with ASTM C 231 for each set of test cylinders taken.
v. Identify all test cylinders with symbols to indicate location on the job where concrete test was made. Record on project record drawings.
vi. Strength tests shall be made for: each day's pour; each class of concrete; each change of supplies or sources; and for each 100 cubic yards of concrete or fraction thereof.

vii. One slump test shall be made for each set of test cylinders taken following the procedure in ASTM C 143.

b. Test Cylinders for all Concrete

i. Each test shall consist of a minimum of four cylinders.

ii. Make test cylinders in conformity with ASTM C 31.

iii. After 24 hours three cylinders to be carefully transported to the testing laboratory for moisture curing and one cylinder to be field cured.

iv. One field cured cylinder to be tested at 7 days and two laboratory cured cylinders to be tested at 28 days. Reserve one cylinder for further testing.

v. The average of all strength tests representing each class of concrete, as well as the average of any three consecutive strength tests for each class of concrete, shall be equal to or greater than the specified strength.

vi. If the A/E has reason to believe that cylinder strength tests are not representative of the strength of concrete in place, A/E shall require drilled cores to be cut and tested at the Contractor's expense. Coring and testing shall be in accordance with ASTM C 42 Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

B. **Section 05 12 00: Structural Steel Framing**

1. Welding:

a. Provide inspection of shop and field welding in accordance with Section 6 of AWS D1.1.

b. Visually inspect all welds, perform appropriate non-destructive tests on apparent defective welds. Verify conformance with Specifications.

c. Non-destructive testing shall be performed on 20 percent of the total length of all full penetration welds. If a sufficient number of welds are deficient, additional testing may be performed at the discretion of the testing lab, at no cost to Owner.

2. Bolting:

a. Visually inspect all connections for proper number, size and type of bolt.

b. Review all bolted connections for compliance with "snug tight" requirements of AISC.

c. No Slip-critical (SC) connections/bolts are required for this project.

d. Shear Connectors, Headed/Deformed Bar Concrete Anchors:

i. Verify pre-production test records for installation of shear connectors, concrete anchors and threaded studs.

ii. Shear connectors shall be struck with a hammer. Those not producing a "clean" pinging sound indicative of a fully attached shear connector shall be bent 15 degrees off vertical towards the nearest support by striking with a hammer. If shear connector does not become loose and weld is not broken, it shall be considered acceptable, and shall be left in the bent position. Replace failing shear connectors and test as before.

iii. A visual inspection shall be made of shear connectors and headed/deformed bar concrete anchors after installation. If visual inspection reveals that a sound weld and a 360 degree flash has not been obtained, the connector/anchor shall also be tested by bending a minimum of 15 degrees off vertical opposite to the missing weld/flash, irrespective of the results of the "ping" test required for shear connectors. If the connector/anchor does not become loose it shall be considered acceptable and shall be left in this position. Replace failing connector/anchors and inspect as before.

C. **Section 05 40 00: Cold Formed Steel Framing**

1. As directed by A/E, Contractor's testing agency may inspect the maintenance of a quality control program including spot checking weldments and welding procedures in accordance with AWS standards.

D. **Section 31 20 00: Soil Compaction Control and Trenching and Backfilling**

1. Soils Engineer to be onsite during excavation operation.

2. Visually inspect, test, and certify that exposed undisturbed underlying soil is suitable for required footing bearing capacity and placement of fills.

3. Maximum and minimum density of fill soil for compaction percentage of relative density and moisture density shall be determined in accordance with ASTM Designation D 1557. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.

4. Number of tests as follows:

a. Subgrade, Undisturbed and Demolition Surfaces: Visual inspection and probe; test if required.

b. Interior Fills: One test per 2,500 sq. ft for each two foot or less lift.

c. Exterior Fills: One test per 2,500 sq. ft for each two foot or less lift.

d. Utility Trenches: One test per 50 lineal feet for each two foot or less lift.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1. SUMMARY

A. This Section includes general procedural requirements for temporary facilities and controls including, but not limited to the following:
1. Temporary Utilities
2. Telecommunications Services
3. Temporary Sanitary Facilities
4. Barriers
5. Fencing
6. Exterior Enclosures
7. Security
8. Vehicular Access and Parking
6. Waste Removal
7. Project Identification
8. Field Offices

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 31 19 Progress Meetings
B. Section 01 31 23 Project Management Web Site
C. Section 01 74 19 Construction Waste Management and Disposal

1.3. QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
1. Building Code requirements
2. Health and safety regulations
3. Utility company regulations
4. Police, Fire Department and Rescue Squad rules
5. Environmental protection regulations
6. Joint Commission - Hospital Accreditation Standards

B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities".
C. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code".

1.4. TEMPORARY UTILITIES

A. Contractor will provide the following:
1. Electrical power and metering, consisting of existing facilities.
2. Water supply, consisting of existing facilities.
3. Contractor is required to change service, bill, and pay for all usage costs.
B. General:
1. Existing facilities may be used.
2. New permanent facilities may be used.
3. Contractor is required to change service, bill, and pay for all usage costs.
C. Water Service: water is available from existing building services.
1. Use trigger-operated nozzles for water hoses, to avoid waste of water.
3. Contractor is required to change service, bill, and pay for all usage costs.
D. Temporary Electric Power Service: Electrical Contractor shall extend temporary power from existing building services.
E. Temporary Lighting: Electrical Contractor shall provide temporary lighting with local switching
1. Install and operate temporary lighting, minimum of 30 fc, to fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for all areas of work, including construction operations and traffic conditions.
F. Temporary Heat: General Contractor shall provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
1. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
a. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

1.5. TELECOMMUNICATIONS SERVICES AND WI-FI

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization through construction closeout.
B. Telecommunications services shall include:
1. Windows-based personal computer dedicated to project telecommunications.
2. Shared access to the internet via WIFI or similar wireless connection.
a. Access must be capable to support minimum of 10 wireless devices.
3. Email Account/address dedicated for GC Project Manager of GC Supervisor on site.

1.6. TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
B. Temporary toilets: Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials foreach facility. Provide covered waste containers for used material.
2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
C. Maintain daily in clean and sanitary condition
D. Water: Provide potable water approved by local health authorities

1.7. BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

1.8. FENCING

A. Construction: Refer to Plan Documents and Specification Section 01 76 00: Fencing Materials and Barricades

1.9. EXTERIOR ENCLOSURES

A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.10. SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.11. VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
B. Coordinate access and haul routes with governing authorities and Owner.
C. Provide and maintain access to fire hydrants, free of obstructions.
D. Existing parking areas located at the project site may be used for construction parking until MADISON PUBLIC MARKET is occupied by Owner.

1.12. WASTE REMOVAL

A. See Section 01 74 19 - Waste Management, for additional requirements.
B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
C. Provide containers with lids. Remove trash from site periodically.
D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.13. PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction indicated in Section 01 58 13.
B. Erect on site at location determined by Owner.
C. No other signs are allowed without Owner permission except those required by law.

1.14. FIELD OFFICES

A. Office: Weather tight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack and drawing display table.
B. Field Office shall be located within the building.
C. Provide space for Project Meetings with table and chairs to accommodate a minimum of fifteen (15) persons.
D. Provide a minimum of a 40” LCD monitor or other digital projection device to be connected to the computer identified in Section 1.4 Telecommunications Services (above), for use during progress meetings in connection with reviewing construction progress information posted to the Project Management Web Site (Specification 01 31 23) hosted by the Owner.

PART 2 - PRODUCTS

2.1. TEMPORARY PARTITIONS

A. Provide dustproof partitions to limit dust and dirt migration and to separate occupied areas from fumes and noise.
    1. Non-fire rated partitions, standard
        a. Wood stud framing, 6-mil polyethylene

2.2. EQUIPMENT

A. Temporary Lifts and Hoists: Contractors requiring temporary lifts and hoists shall provide facilities for hoisting materials and employees.

B. Electrical Outlets: Electrical Contractor shall provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

C. Electrical Power Cords: Contractors requiring power cords shall provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

D. Lamps and Light Fixtures: Electrical Contractor shall provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

E. Heating Units: General Contractor shall provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.

F. First Aid Supplies: General Contractor shall provide first aid supplies complying with governing regulations.

G. Fire Extinguishers: General Contractor shall provide hand-carried, portable UL-rated, fire extinguishers of NFPA recommended classes for the exposures, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1. TEMPORARY FIRE PROTECTION

A. Until fire protection needs are supplied by permanent facilities, General Contractor shall install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses.

B. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations".

C. Locate fire extinguishers where convenient and effective for their intended purpose.

D. Store combustible materials in containers in fire-safe locations.

E. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires.

F. Prohibit smoking on the premises.

G. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

H. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site

I. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.2. COLLECTION AND DISPOSAL OF WASTE

A. Collect waste from construction areas and elsewhere daily

B. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly.

C. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F.

D. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.3. ENVIRONMENTAL PROTECTION

A. Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.

B. Avoid use of tools and equipment which produce harmful noise.

C. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.4. REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials prior to Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

END OF SECTION

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SECTION 01 57 19.11
INDOOR AIR QUALITY (IAQ) MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Special requirements for Indoor Air Quality (IAQ) management during construction operations.
      a. Control of emissions during construction.
      b. Moisture control during construction.
   2. Procedures for testing baseline IAQ. Baseline IAQ requirements specify maximum indoor pollutant concentrations for acceptance of the facility.

B. Related Sections:
   1. Section 01 40 00 – Quality Requirements: Meetings and project coordination.
   2. Section 01 81 13 – Sustainable Design requirements: Meetings, testing, verification and project coordination.

1.2 DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E2114.

B. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.

C. Hazardous Materials: Any material that is regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.
   1. Hazardous materials include pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).

D. Indoor Air Quality (IAQ): The composition and characteristics of the air in an enclosed space that affect the occupants of that space. The indoor air quality of a space refers to the relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including those that impact thermal comfort such as air temperature, relative humidity and air speed.

E. Interior final finishes: Materials and products that will be exposed at interior occupied spaces; including flooring, wall covering, finish carpentry, and ceilings.

F. Packaged dry products: Materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.

G. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and other materials which require curing.

1.3 SUBMITTALS

A. Indoor Air Quality (IAQ) Management Plan: Not less than 10 days before the Pre-construction meeting, prepare and submit an IAQ Management Plan including, but not limited to, the following:
   1. Procedures for control of emissions during construction.
      a. Identify schedule for application of interior finishes.
   2. Procedures for moisture control during construction.
      a. Identify porous materials and absorptive materials.
      b. Identify schedule for inspection of stored and installed absorptive materials.
   3. Revise and resubmit Plan as required by Owner.

a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

B. Product Data:
1. Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
2. Submit air pressure difference maps for each mode of operation of HVAC.
3. Material Safety Data Sheets: Submit MSDSs for inclusion in Operation and Maintenance Manual for the following products. Coordinate with Section 01 78 23.
a. Adhesives.
b. Floor and wall patching/leveling materials.
c. Caulking and sealants.
d. Insulating materials.
e. Fireproofing and firestopping.
f. Carpet.
g. Paint.
h. Clear finish for wood surfaces.
i. Lubricants.
j. Cleaning products.

C. Inspection and Test Reports:
1. Moisture control inspections.
2. Moisture penetration testing.

1.4 PRECONSTRUCTION MEETING

A. After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Owner and Architect to discuss the proposed IAQ Management Plan and to develop mutual understanding relative to details of environmental protection.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 IAQ MANAGEMENT - EMMISSIONS CONTROL

A. During construction operations, follow the recommendations in SMACNA IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3).

B. HVAC Protection:
1. Provide temporary exhaust during construction operations.
2. To the greatest extent possible, isolate and/or shut down the return side of the HVAC system during construction. When ventilation system must be operational during construction activities, provide temporary filters.
3. Do not use new HVAC equipment for construction ventilation without prior approval of Architect.

C. Source Control: Provide low and zero VOC materials as specified.

D. Pathway Interruption: Isolate areas of work as necessary to prevent contamination of clean or occupied spaces. Provide pressure differentials and/or physical barriers to protect clean or occupied spaces.

E. Housekeeping: During construction, maintain project and building products and systems to prevent contamination of building spaces.

F. Temporary Ventilation: Provide an ACH (air changes per hour) of 1.5 or more and as follows:
1. Provide minimum 48 hour pre-ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by Architect.
2. Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
3. Provide filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ASHRAE 52.2 during construction. Coordinate with work of Division 23, Heating Ventilating and Air Conditioning (HVAC). If permanently installed air handlers are to be used for ventilation (with approval of Architect), such filtration must be provided at each return air opening.

G. Scheduling: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible.

H. Flush-Out: Refer to Section 01 81 13.

3.2 IAQ MANAGEMENT - MOISTURE CONTROL

A. Housekeeping:
1. Keep materials dry. Protect stored on-site and installed absorptive materials from moisture damage.
2. Verify that installed materials and products are dry prior to sealing and weatherproofing the building envelope.
3. Install interior absorptive materials only after building envelope is sealed and weatherproofed.

B. Inspections: Document and report results of inspections; state whether of not inspections indicate satisfactory conditions.
1. Examine materials for dampness as they arrive. If acceptable to Architect/Owner, dry damp materials completely prior to installation; otherwise, reject materials that arrive damp.
2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.
3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect weekly,**.**
   a. Where stored on-site or installed absorptive materials become wet, notify Architect. Inspect for damage. If acceptable to Architect/Owner, dry completely prior to closing in assemblies; otherwise, remove and replace with new materials.
4. Site drainage: Verify that final grades of site work and landscaping drain surface water and ground water away from the building.
5. Weather-proofing: Inspect moisture control materials as they are being installed. Include the following:
   a. Air barrier: Verify air barrier is installed without punctures and/or other damage. Verify air barrier is sealed completely.
   b. lashing: Verify correct shingling of the flashing for roof, walls, windows, doors, and other penetrations.
   c. Insulation layer: Verify insulation is installed without voids.
   d. Roofing: In accordance with ASTM D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair.
6. Plumbing: Verify satisfactory pressure test of pipes and drains is performed before closing in and insulating lines.
7. HVAC: Inspect HVAC system as specified in Section 01 91 00 – Commissioning, and the following:
   a. Condensate pans are sloped and plumbed correctly.
   b. Access panels are installed to allow for inspection and cleaning of coils and ductwork downstream of coils.
   c. Ductwork and return plenums are air sealed.
   d. Duct insulation is installed and sealed.
   e. Chilled water line and refrigerant line insulation are installed and sealed.

C. Schedule:
1. Schedule work such that absorptive materials, including but not limited to porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from rain and construction-related water.
2. Weather-proof as quickly as possible. Schedule installation of moisture-control materials, including but not limited to air barriers, flashing, exterior sealants and roofing, at the earliest possible time.

END OF SECTION

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SECTION 01 58 13
TEMPORARY PROJECT SIGNAGE

PART 1 – GENERAL

1.1. SECTION INCLUDES

A. Project identification sign.

1.2. QUALITY ASSURANCE

A. Design sign and structure to withstand 50 miles/hr wind velocity.
B. Sign Painter: Experienced as a professional sign painter for minimum three years.
C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.3. SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements for submittal procedures.
B. Shop Drawing: Show content, layout, lettering, color, structure, sizes.

PART 2 - PRODUCTS

2.1. SIGN MATERIALS

A. Structure and Framing: New, wood, structurally adequate.
B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum ¾" thick, standard large sizes to minimize joints.
C. Rough Hardware: Galvanized

2.2. PROJECT IDENTIFICATION SIGN

A. One painted sign, 32 sq ft area, bottom 6 feet above ground.
B. Content:
1. Project title, City of Madison, Agency logo and name of Owner as indicated on Contract Documents.
2. Names and title of Architect.
3. Name of Prime Contractor.
4. Full color project rendering from high resolution image as furnished by Architect.

PART 3 - EXECUTION

3.1. INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
B. Erect at designated location.
C. Install sign surface plumb and level, with butt joints. Anchor securely.

3.2. REMOVAL

A. Remove sign, framing supports, and foundations at completion of Project and restore the area.

END OF SECTION

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SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide general guidelines and responsibilities related to the receiving, handling, and storage of all materials and products from arrival on the job site through installation.
   1. Immediate inspection of delivered goods means a timely replacement if damaged.
   2. Proper storage helps prevent damage and loss by weather, vandalism, theft, and job site accidents.
   3. Proper storage helps with job site performance and safety.
   2. Proper handling helps prevent damage and job site accidents.

B. Each Contractor shall be directly responsible for the receiving, handling, and storage of all materials and products associated with the Work of their Division or Trade.

C. Each Contractor responsible for Work associated with Owner provided materials or products shall be responsible for the receiving, handling and storage of the material/product as outlined in Section 3.8 below..

1.2. RELATED SPECIFICATIONS

A. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".
   1. Use the following link to access the Standard Specifications web page:
      http://www.cityofmadison.com/business/pw/specs.cfm
      a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
      b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.
      c. City Standard Detail Drawings (SDD) may be located from the index in Part VIII.

B. Section 01 57 19.11 Indoor Air Quality (IAQ) Management

C. Section 01 74 13 Progress Cleaning

D. Section 01 76 00 Protecting Installed Construction

E. Other Divisions and Specifications that may address more specifically the requirements for the storage and handling of materials and products associated Work of other Divisions or Trades.

1.3. QUALITY ASSURANCE

A. The GC shall be responsible for ensuring that these minimum storage and handling requirements are met by all contractors on the project site including but not limited to the following:
   1. Receiving deliveries of materials, products, and equipment.
      a. Inspect all deliveries upon arrival for damage, completeness, and compliance with the construction documents.
         i. Deliveries shall remain in original packaging or crates, shipping manifest shall be kept with the delivery and the packaging shall have visible identification of the items within the packaging.

b. Immediately report any damaged products or equipment to the GC, begin arrangements for immediate replacement.
c. Materials or equipment that have been damaged, are incomplete, or do not comply with the construction documents shall not be permitted to be installed.

2. All materials and products shall be stored within the designated limits of the project site. Only store the amount of material necessary for upcoming operations so as not to interfere with other construction activities and access to Work by the Owner and Architect. Any offsite storage shall be at the expense of the contractor storing the material or product. All offsite storage requirements shall comply with this specification. All offsite storage of materials is subject to Owner Representative Quality Management review at any time.
3. Large storage containers may be used but shall be weather tight, securable, placed on concrete blocks, timbers, or jack stands and shall be level.
4. When lifting equipment is required the equipment rating shall be greater than the loading requirements of the item being lifted. In addition all of the following shall apply as necessary:
   a. Only designated and/or designed lift points shall be used.
   b. Large items shall have tag lines and handlers at all times during lifting operations.
   c. Lift at multiple points as needed to prevent bending.
5. Materials and products stored inside of the structure shall comply with all of the following:
   a. Storage shall not be allowed to impede the flow of work in progress.
   b. Storage shall not be allowed to hide completed work from review and inspections.
   c. Storage shall not exceed the design loads of the structural components it is being stored upon.
6. All materials and products shall be stored according the manufacturers minimum recommended requirements. All of the following shall be considered before storing any product or material:
   a. Dust and dirt
   b. Moisture and humidity, including rain and snow
   c. Excessive temperatures, direct sun, etc
   d. Product or material weight and size
   e. Potential for breakage
   f. Product incompatibility with other products such as corrosiveness, chemical reactions, flammability, etc.
   g. Product or material value and replacement cost
7. The Contractor shall be responsible for providing fully functional tarps or plastic wrap, to protect materials and products from the weather. All coverings shall be free of large holes and tears, and shall be tied, strapped, or weighted down to resist blowing.
8. The Contractor shall be responsible for any temporary heating, cooling, or other utility requirement that may be associated with the storage of a material or product.
9. The Contractor shall be responsible for securing materials and products of value such as copper, A/V equipment, etc. Such items shall be stored in securable shipping containers, job trailers or other such storage devices. Container shall be kept secured when not in use.

B. The GC shall inspect the job site daily to ensure that all products and materials stay weather tight and are secured against vandalism or theft as required by this specification.
C. The Owners Representative may at any time request improvements regarding storage of any material or product being provided under these construction documents.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL CONTRACTOR REQUIREMENTS

A. Designate material storage and handling areas as needed including all of the following:
   1. Designate specific areas of the site for delivery and storage of materials to be used during the execution of the Work.
   2. Designated areas shall not be located so as to interfere with the installation of any Work including Work by others such as the installation of utilities or the maintenance of existing utilities. This shall include not storing items in active utility easements as designated by the site plan.
B. Arrange for openings in the building as needed to allow delivery and installation of large items. Openings shall be appropriately sized to include the use of booms, slings, and other such lifting devices that may be larger than the item being installed.

1. When openings are required in completed Work (new or existing) the GC shall be responsible for providing an appropriate opening and for restoring the opening to the original or better condition upon completion. Restoration shall be weather tight and complete.

C. Repeated moving and handling of items being stored shall not be allowed. The GC shall be responsible for any damage and replacement because of mishandling or excessive handling.

3.2. BULK MATERIAL

A. Bulk material such as sand, gravel, top soil and other types of fill shall be stored away from the construction area and shall be stock piled as follows:
1. All bulk material shall be piled safely and efficiently in as small an area as practical. Only store the amount of material necessary for upcoming operations so as not to interfere with other construction activities and access to Work by the Owner and Architect.
2. All stock piles shall have silt fence/sock properly installed around the perimeter to prevent erosion and loss of material. Refer to City of Madison Standard Specification Section 210.1(f) and other related specification or details.
3. Fine grained material shall be protected with tarps to prevent blowing. Tarps shall be weighted or staked to stay in place.

B. Bulk material such as brick, concrete block, stone, and other palletized materials shall be stored on original shipping pallets until ready for use.

3.3. DRY PACKAGED MATERIAL

A. Dry packaged material such as cement, mortar, etc shall be stored on pallets, on slightly elevated ground or clear stone pad to keep water away from the base of the material being stored. Protect from moisture.

3.4. STRUCTURAL AND FRAMING MATERIAL

A. All structural and framing material shall be stored in an organized manner arranged by type, size and dimension. Materials shall be stored on pallets or timbers as necessary and shall not be allowed to lie directly on the ground.

B. Long and heavy items shall be supported at several points to prevent bending and warping.

3.5. EQUIPMENT

A. Equipment delivered to the site shall be stored away from all construction activities until the item can either be moved inside or properly installed.

B. Equipment shall be stored on slightly elevated ground or clear stone pad to keep water away from the base of the equipment.

3.6. FINISH PRODUCTS

A. Finish products such as flooring, tile, counters, lockers, toilets, partitions, lighting, and other similar items should not be delivered and stored until the structure has been enclosed, is weather tight, temperature controlled and the contractor is ready for such items to be installed.
1. Storage of finished products outside for any length of time shall not be allowed.

B. Products that cannot be stored inside the structure shall be stored in secured containers or job trailers until such time as they are ready to be installed.

C. Products with a high potential for breakage such as glass, mirrors, tiles, toilet fixtures, etc. shall be stored with additional protection as necessary such as but not limited to the following:
1. Store in original shipping containers until ready for installation.
2. Do not store in high traffic areas.
3. Shield with other materials such as cardboard, plywood, or similar products.

3.7. DUCTWORK, PIPING, AND CONDUIT

A. All piping and conduit shall be stored horizontally unless otherwise specified by the manufacturer or Division and Trade Specifications.
1. Do not store directly on grade.
2. Cover metal pipes and tubes to prevent rust and corrosion, allow ventilation to prevent condensation.
3. Whenever possible use pipe stands for storing pipe and conduit to prevent tripping and rolling hazards.

B. All ductwork shall be stored horizontally or vertically as necessary unless otherwise specified by the manufacturer or Division and Trade Specifications.
1. During storage, both ends of each duct shall be protected with plastic sheathing to prevent dust and dirt from getting inside the duct. Sheathing shall be sufficiently taped to the duct.

2. After installation, free/open ends shall remain protected with taped plastic sheathing and or temporary filters as specified by division or Trade specifications.

3.8. OWNER PROVIDED, CONTRACTOR INSTALLED EQUIPMENT

A. Section 3.8.A. shall apply to all equipment being provided to any contractor directly from the Owner for installation under the contract.
   1. The Owner or Owners Representative shall do the following:
      a. Inspect all deliveries upon receipt and notify manufacturer of any issues directly.
      b. Review the received shipment with the contractor.
         i. Only provide products or materials to the contractor that were not damaged through shipping or handling.
         ii. Confirm missing products or materials and anticipated delivery schedule if known.
   2. The Contractor responsible for the installation of Work associated with Owner provided materials or products shall "take ownership" and provide safe and secure storage and handling as previously described within this specification.
      i. The Contractor shall be liable for the repair or replacement of any material or product damaged after taking ownership of the product from receipt through final acceptance.

B. Section 3.8.B. shall apply to all equipment being provided by the Owner but shipped directly to any sub-contractor or the project site for installation under the contract.
   1. The GC and/or Contractor responsible for the Work associated with the Owner provided materials or products shall do the following:
      a. Inspect all deliveries upon receipt and notify the Owner or Owners Representative of any issues directly.
         i. Owner or Owners Representative shall notify manufacturer of any issues directly.
      b. Review the received shipment with the Owner or Owners Representative
         i. Confirm missing products or materials and anticipated delivery schedule if known.
   2. The Contractor shall "take ownership" and provide safe and secure storage and handling as previously described within this specification.
      i. The Contractor shall be liable for the repair or replacement of any material or product damaged after taking ownership of the product from receipt through final acceptance.

END OF SECTION

SECTION 01 71 23
FIELD ENGINEERING

PART 1 – GENERAL

1.1. REQUIREMENTS INCLUDED

A. The Contractor shall provide and pay for field engineering services required for the Project:
   1. Land surveying services required to execute the Work, to include building addition location and layout, and location and layout of pavements and all proposed site improvements.
   2. Verification of existing building dimensions, elevations, and relationship to proposed additions.
   3. Professional Engineering services to execute Contractor's construction methods.
   4. Registered Professional Engineer in the State of Wisconsin to determine the load capacity of the existing structure for use of Contractors temporary facilities, equipment, lifts, machinery, material storage, etc.

1.2. RELATED REQUIREMENTS

A. Conditions of the Contract

1.3. PROCEDURES

A. A property survey has been prepared for the Owner and has been bound with Contract Drawings. Surveys shall describe physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. If information is incomplete, notify Owner to furnish additional information. Verify easement locations, front, side, and rear yard restrictions, if any; and property line locations. Verify control points, and establish bench marks. Locate and layout roads, walks, parking areas and all civil structures and all proposed site improvements.

B. Verify locations of underground services, utilities, structures, etc. which may be encountered or affected by the Work.

1.4. PROJECT SURVEY REQUIREMENTS

A. Using datum, the lot lines and present levels have been established as indicated on the Drawings. Other grades, lines, levels and benchmarks, shall be established and maintained by the Contractor, who shall be responsible for them. As work progresses, the Contractor shall layout on forms and floor, the locations of all partitions, walls and fix column centerlines as a guide to all trades. The Contractor shall make provision to preserve property line stakes, benchmarks, or datum point. If any are lost, displaced or disturbed through neglect of any Contractor, Contractor's agents or employee, the Contractor responsible shall pay the cost of restoration.

B. Establish lines and levels, locate and layout, by instrumentation and similar appropriate means, additions, column locations, floor levels, stakes for walks, etc.

C. Provide data to all Subcontractors for their use as applicable.

D. From time to time, verify layouts by same methods.

1.5. RECORDS

A. Maintain a complete, accurate log of all control and survey work as it progresses.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 01 73 29
CUTTING AND PATCHING

PART 1 – GENERAL

1.1. SUMMARY

A. This Section includes general procedural requirements for cutting and patching including, but not limited to the following:
   1. Examination
   2. Preparation
   3. Performance
   4. Cleanup and Restoration

1.2. RELATED SPECIFICATION SECTIONS

A. Divisions 02 through 32 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
B. Division 07 Section "Penetration Fire Stopping" for patching fire-rated construction.

1.3. DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.
C. Level Alpha

1.4. QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that may result in increased maintenance or decreased operational life or safety.
C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that may result in increased maintenance or decreased operational life or safety. Some miscellaneous elements include the following:
   1. Water, moisture, or vapor barriers
   2. Membranes and flashings
   3. Exterior curtain-wall construction
   4. Equipment supports
   5. Piping, ductwork, vessels, and equipment
   6. Noise and vibration control elements and systems
D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.5. WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

B. All cutting and patching work performed under this contract shall be warranted like new work as defined by the Specification governing the work.

PART 2 - MATERIALS

2.1. GENERAL

A. Comply with requirements specified within other sections of the Specifications.

B. In-Place Materials: Use materials identical to existing in-place materials. For exposed surfaces use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1. EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction and existing conditions during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations. If the failure to protect, or the lack of protection, of in-place construction and/or existing conditions results in damage, the contractor shall be responsible for repair to previous condition.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to eliminate interruption to occupied areas.

3.3. PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 3l Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

D. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

3.4. CLEANUP AND RESTORATION

A. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

1. Clean piping, conduit, and similar features before applying paint or other finishing materials.
2. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
5. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.
7. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
8. Any smoke and fire caulking that has been disturbed must be replaced by the Contractor as required by code.

END OF SECTION

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SECTION 01 74 13
PROGRESS CLEANING

PART 1 – GENERAL

1.1. SUMMARY

A. Throughout the execution of this contract all contractors shall be responsible for maintaining the project site in a standard of cleanliness as described in this specification.

B. All contractors shall also comply with the requirements for cleaning as described in other specifications.

C. Work included in this specification shall include but not be limited to:

1. Safety Cleaning
2. Project Site Cleaning
3. Progress Cleaning
4. Final Cleaning

1.2. RELATED SPECIFICAITONS

A.	Section 01 35 00	Special Procedures
B.	Section 01 60 00	Product Requirements
C.	Section 01 74 19	Construction Waste Management and Disposal
D.	Section 01 76 00	Protecting Installed Construction

1.3. QUALITY ASSURANCE

A. The General Contractor (GC) shall conduct daily inspections, more often if necessary, of the entire project site to ensure the requirements of cleanliness are being met as described within these specifications.

B. All contractors shall comply with other regulatory requirements as they apply to waste recycling, reuse, hauling, and disposal requirements of any governmental authority having jurisdiction.

C. The Owner reserves the right to have work done by others in the event any contractor fails to perform cleaning as described within these specifications. The cost of any Owner provided cleaning shall be charged to the contractor through a deduct change order.

PART 2 - PRODUCTS

2.1. CLEANING MATERIALS AND EQUIPMENT

A. The Contractor shall provide all required personnel, equipment, and materials necessary to maintain the required level of cleanliness as described in this specification.

B. Use only cleaning materials and equipment that are compatible with the surface being cleaned, as recommended by the manufacturer, or as approved by the A/E.

C. Use only cleaning materials, equipment, and methods as recommended in the manufacturers care and use guide of the material, finish or equipment being cleaned.

PART 3 - EXECUTION

3.1. SAFETY CLEANING

A. All Contractors shall be responsible for safety cleaning as required by OSHA and other regulatory requirements as applicable.

B. Safety Cleaning shall include but not be limited to the following:
   1. All work areas, passageways, ramps, and stairs shall be kept free of debris, scrap materials, pallets, and other large items that would obstruct exiting routes. Small items such as tools, electrical cords, etc are picked up when not in use.
   2. Form and scrap lumber shall have nails/screws removed or bent over. Lumber shall be neatly stacked in an area designated by the GC.
   3. Spills of oil, grease, and other such liquids shall be cleaned immediately or sprinkled with sand/oil-dry first, then cleaned.
   4. Oily, flammable, or hazardous items shall be stored in appropriate covered containers and storage devices unless actively being used.
   5. Oily, or flammable rags, and other such waste shall only be disposed of in authorized covered containers.
   6. Disposal by burning shall not be allowed at any time.

3.2. PROJECT SITE CLEANING

A. This section applies to the general cleanliness of the project site as a whole for the duration of the execution of this contract.

B. Exterior Project Site Areas
   1. The GC and other Contractors as appropriate shall ensure the following levels of cleanliness are applied to the exterior project site areas.
      a. The overall appearance of the project site is neat and orderly. Defined areas for material storage, material waste, job trailers, and the project area are clean and well maintained.
      b. The construction fence is maintained, erect with no gaps, and properly posted per all regulatory requirements.
      c. All erosion control measures are properly maintained, cleaned, and repaired as necessary.
      d. All loose materials (construction or waste) are properly tied or weighted down to resist blowing.
      e. All construction materials are properly covered with fully functional tarps or plastic wrap, protected from the weather, coverings are tied, strapped, or weighted down to resist blowing.
      f. Dust control is applied as necessary or as required by any regulatory requirement.

C. Interior Project Site Areas
   1. All Contractors shall ensure the following levels of cleanliness are applied to the interior project site areas.
      a. The overall appearance of the project site is neat and orderly. Defined areas for material storage, material waste, and project area are clean and well maintained.
      b. Stored materials are kept in original shipping containers whenever possible. Stored materials not in shipping containers are properly stored and protected according to other applicable specifications.
      c. All scraps and debris shall be properly disposed of as often as necessary to keep work areas, passageways, stairs, and ramps free of debris and clear for emergency exiting.
      d. Boxes, pallets, and other such shipping containers, are broken down, stored in a consolidated area or, disposed of as often as is necessary.
      e. Hand tools, supplies, materials, electrical cords not being used are picked up and sptored in gang boxes, not left as walking hazards in work areas, passageways, etc.

D. Job Trailer
   1. The interior of the job trailer shall be kept clean and available as a work space at all times. The GC shall ensure that the following is provided for within the job trailer:
      a. Meeting space including tables and chairs.
      b. Sufficient space for all contractors to access the official construction documents, provide updates, etc.

3.3. PROGRESS CLEANING

A. This sub-section shall apply to all Progress Cleaning prior to the installation of finishes, fixtures, and trim (IE rough-in).
   1. For the purposes of this section “clean” shall be defined as a level of cleanliness free of dust and other material capable of being removed by use of reasonable effort using a good quality janitor broom and shop-vac.
   2. Daily cleanings shall be conducted by all contractors at the end of the work day as follows:
      a. Debris in excavated areas shall be removed prior to backfill and compaction.
      b. Debris in wall cavities, chase spaces, etc shall be removed prior to enclosing the spaces.

c. Large items shall be properly stored, returned to designated areas, or disposed of as necessary.
d. Loose materials shall be properly secured.
e. Flammable or hazardous materials are properly stored or disposed of.

3. Weekly cleaning shall be conducted by all contractors as designated by the GC. Weekly cleanings shall include all the above for a daily cleaning and other necessary cleaning as designated by the GC.

B. This sub-section shall apply to Progress Cleaning in preparation for the installation of finishes, fixtures, and trim.
a. Surfaces receiving finishes shall be thoroughly cleaned prior to contractors applying finish materials. The GC shall be responsible for inspecting the area and surfaces being cleaned for finish prior to the sub-contractor applying the finish. This shall include but not be limited to the following:
i. Wall surfaces shall be wiped clean of dirt and oily residues, vacuumed free of dust, and shall be free of surface imperfections prior to painting or installing wall coverings.
ii. Metal surfaces shall be wiped clean of dirt and oily residues, and be free of surface imperfections prior to painting.
iii. Flooring shall be broom swept of large and loose items then vacuumed clean of dust and small particles, and damp mopped clean and dried prior to installing any flooring finish. Additional cleaning may be required depending on the preparation requirements recommended by the flooring material manufacturer.

C. This sub-section shall apply to Progress Cleaning after the installation of finishes, fixtures, and trim.
1. For the purposes of this section "clean" shall be defined as a level of cleanliness free of dust and other material capable of damaging or visually disfiguring finished work, finishes, fixtures, and trim.
2. Progress Cleaning at this point in the contract shall be conducted immediately as follows:
a. Dust, dirt, etc shall be swept and vacuumed off of finish flooring and trim.
b. Liquid spills shall be cleaned up according to the spill type. This shall include drips and spills caused by paint, stain, sealants, and other such items.
3. The Contractor(s) at no additional cost to the Owner shall be responsible for replacing any finished work, finishes, fixtures, and trim damaged or disfigured because of inadequate or improper cleaning.

3.4. FINAL CLEANING

A. As noted in Specification 01 29 76 Progress Payment Procedures, Progress Payment Milestone Schedule, Final Cleaning shall not be conducted prior to requesting the 90% contract total progress payment and all of the following shall be complete:
1. All final regulatory inspections including but not limited to Building Inspection Department and Madison Fire Department inspections have been successfully completed.
2. All Quality Management Observation (QMO) reports have been closed out.
3. All Demonstration and Training has been completed.
4. All Attic Stock has been consolidated and located to its designated area
5. All protection for installed construction shall be removed prior to final cleaning by the contractor responsible for providing the protections. This shall include the removal of any adhesive residues left behind from tapes. Contractors shall only use manufacturer authorized cleaning materials for removing adhesives, etc.

B. For the purposes of this section "clean" shall be defined as a level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

C. The GC shall be responsible for ensuring that all requirements under this section are being met.

D. General Requirements
1. Employ experienced personnel or professional cleaners for final cleaning as necessary for the areas or equipment being cleaned.
2. Cleaning equipment used shall be commercial grade equipment commonly used by professional cleaners.
3. Cleaning equipment and materials shall be cleaned, rinsed, or replaced to ensure a uniform level of cleanliness is being maintained during the final cleaning. This shall include but not be limited to the following:
a. Vacuum cleaner bags and/or filters are changed and/or cleaned as often as necessary.
b. Dust & wipe down rags are washed, rinsed, or replaced before starting each room.
c. Mopping equipment
i. Mop water for washing shall have cleaning solution added to the amount and temperature per manufacturer's recommendations. Mop washing water shall be replaced often to maintain the levels of the cleaning solution and temperature required.
ii. Mop water for rinsing shall remain clean, clear, and be replaced as often as necessary.

iii. Mop heads shall be rinsed often and replaced as necessary.
iv. Mop heads and buckets shall be thoroughly rinsed with each change of water.
v. Only new mop heads shall be used for rinsing.

E. Refer to all other specifications in this contract for specific requirements regarding final cleaning of finishes, fixtures, equipment, etc.

F. Exterior Cleaning shall include but not be limited to the following:
1. All exterior glazing surfaces have been professionally cleaned and are free of dust and streaking.
2. Metal roofs, siding, and other surfaces shall be clean of dirt and free of splashed or excess materials such as sealants, mortar, paint, etc.
3. All exterior furnishings shall be clean, waste receptacles shall be empty.
4. Paved areas shall be clean, free of dirt, oily stains and other such blemishes
5. Exterior lights and diffusers are clean and free of dust.

G. Interior Cleaning shall include but not be limited to the following:
1. Remove all labels, stickers, tags, and other such items which are not required by code as permanent labels.
2. All interior glazing surfaces, including mirrors, have been professionally cleaned and are free of dust and streaking.
3. All interior surfaces have been cleaned of excess materials such as paint, sealants, etc and have been wiped free of dust.
4. Interior metals, fixtures, and trim have been cleaned free of dust and oily residues
5. Carpet flooring has been thoroughly cleaned; vacuumed free of dust, excess glues and other stains removed per manufacturers use and care instructions.
6. Resilient flooring has been thoroughly cleaned; vacuumed free of dust, excess glues and other stains removed, mopped and buffed per manufacturers use and care instructions.
7. Interior non-occupied concrete floors shall be broom cleaned, vacuumed free of dust, excess glues and other stains removed per manufacturers use and care instructions.
8. Light fixtures, lamps, diffusers and other such items have been dusted and cleaned as necessary.

3.5. CALL BACK WORK

A. The GC shall be responsible for ensuring that any contractor returning to the project site for completion or correction work has re-cleaned and restored the area to the levels described in section 3.4 above upon completion of the work. This shall include but not be limited to the following:
1. The immediate area(s) where work was completed.
2. Adjacent areas where dust or debris may have traveled.
3. Other areas occupied during the completion of the call back work.
4. Path of entrance/exit, to/from the area(s) of work.

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 – GENERAL

1.1. SUMMARY

A. This specification includes administrative and procedural requirements for the recycling, re-use, salvaging, and disposal of non-hazardous construction and demolition waste.

B. The General Contractor (GC) shall be fully responsible for complying with all applicable ordinances and other such regulatory requirements during the execution of this contract.

1.2. RELATED SPECIFICAITONS

A. 01 29 76 Progress Payment Procedures
B. 01 31 23 Project Management Web site
C. 01 32 19 Submittals Schedule
D. 01 33 23 Submittals
E. 01 77 00 Closeout Procedures
F. Other Divisions and Specifications that may address the proper disposal of construction or demolition waste as it pertains to work being conducted under that particular specification.

1.3. CITY ORDINANCES

A. There are two (2) Madison General Ordinances (MGO) that the City of Madison has regarding construction and demolition waste.
1. MGO 10.185, Recycling and Reuse of Construction and Demolition Debris, describes the requirements associated with this ordinance including definitions, documentation requirements, and penalties.
2. MGO 28.185, Approval of Demolition (Razing, Wrecking) and Removal, describes the requirements associated with applying for and receiving a demolition permit.

B. All City of Madison, Board of Public Works, contracts being conducted by City Engineering, Facility Management, for construction, remodeling, or demolition shall comply with the above ordinances regardless of project type or size.

1.4. DEFINITIONS

A. Clean: Untreated and unpainted material, free of contamination caused by oils, solvents, caulks, and other chemicals.

B. Construction and Demolition Debris: Materials resulting from the construction, remodeling, repair, and demolition of utilities, structures, buildings, and roads.

C. Disposal: Off-site removal of construction and demolition debris and the subsequent sale, recycling, reuse, or deposit in authorized landfill or incinerator.

D. Hazardous: Exhibiting the characteristics of hazardous substance, i.e. ignitability, corrosiveness, toxicity, or reactivity and including but not limited to asbestos containing materials, lead, mercury and PCBs.

E. Non-hazardous: Exhibiting none of the characteristics of a hazardous substance.

F. Nontoxic: Not immediately poisonous to humans or poisonous after a long period of exposure.
G. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product.
H. Recycle: Any process by which construction or demolition debris is diverted from final disposal as solid waste at a permitted landfill and instead is collected, separated, and/or processed into raw materials for new, reused, or reconstituted products; or for the recovery of materials for energy production processes.
I. Recycler: Any recycling facility, transfer station, or other waste handling facility which accepts construction and demolition debris for recycling, or for other transferring to a recycling facility.
J. Recycling: The process of sorting, cleaning, treating, or reconstituting solid waste and other discarded materials for the purpose of preparing the material to be recyclable. Recycling does not include burning, incinerating or thermally destroying waste.
K. Return: To give back reusable items or unused products to vendors for credit.
L. Reuse: Shall mean any of the following:
    1. The on-site use of reprocessed construction and demolitions debris.
    2. The off-site redistribution of a material, for use in the same manner or similar manner at another location.
    3. The use of non-toxic, clean wood as an alternative fuel source.
M. Salvage: To remove a waste material from the project site for resale or reuse by the Owner or others.
N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
O. Trash: Any product or material unable to be re-used, returned, recycled, or salvaged.
P. Waste: Extra materials or products that have reached the end of its useful life or its intended use. Waste includes salvageable, returnable, recyclable and re-useable construction and demolition materials, and trash.

1.5. PERFORMANCE REQUIREMENTS

A. The GC shall develop a Waste Management Plan that results in end-of-project rates for salvage/recycling/reuse of 95 percent (minimum) by weight of the total waste generated by the Work. Percentages may be adjusted on a project by project basis depending on selected LEED goals associated with the project.
B. The GC shall salvage or recycle 100 percent of all uncontaminated packaging materials including but not limited to the following:
    1. Paper
    2. Cardboard
    3. Beverage containers
    4. Boxes
    5. Plastic Sheet and film
    6. Polystyrene packaging
    7. Wood crates and pallets
    8. Plastic pails and buckets
C. Promote a resourceful use of supplies and materials through proper planning and handling. Generate the least amount of waste possible by minimizing errors, poor planning, breakage, mishandling, contamination or other similar factors.
D. Use all reasonable means to divert construction waste from landfills and incinerators through recycling, reuse, or salvage as appropriate.

1.6. SUBMITTALS AND DELIVERABLES

A. The GC shall provide his/her completed Waste Management Plan to the Project Management Web Site as a submittal for review by the Project Architect and City Project Manager.
    1. See item 1.8 below for Waste Management Plan submittal requirements.
    2. The Waste Management Plan shall be completed, submitted, and approved as a pre-requisite for Progress Payment number 1.
    3. Copies of all documentation required by this specification shall be submitted to the appropriate Project Management Web Site Library. Documentation shall be reviewed by the City Project Manager during all Progress Payment reviews for compliance and accuracy.
B. The Waste Management Coordinator shall provide copies of items 1 through 5 below to the appropriate Project Management Web Site Library and shall update the Waste Management Summary Log to reflect the records being submitted.
    1. Records of Donations: Indicate receipt and acceptance of itemized salvageable waste donated to individuals or organizations. Indicate if the organization is tax exempt.

2. Records of Sales: Indicate receipt and acceptance of itemized salvageable waste sold to individuals or organizations. Indicate if the organization is tax exempt.
3. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts and invoices.
4. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts and invoices.
5. Statement of Refrigerant Recovery: The Refrigerant Recovery Technician responsible for recovering refrigerant shall provide the GC with a statement indicating all of the following:
    a. All recovery was performed according to EPA Regulations.
    b. All refrigerant present was recovered; indicate the total quantity recovered by unit.
    c. Date of Recovery.
    d. Name, address, company name, and phone number of technician performing the recovery.
    e. Technician shall sign and date the statement.

C. LEED Submittal: The GC shall provide the following information using the appropriate LEED letter template upon project completion: indicating that the requirements of the credit have been met. *NOTE: This requirement shall only apply to projects having a LEED certification goal.*
1. Total waste material generated.
2. Total waste material diverted by diversion method; recycling, salvage, re-use, etc.
3. Statement that the credit requirements have been met.
4. GC shall sign the letter.

1.7. QUALITY ASSURANCE

A. Waste Management Coordinator: The GC shall be responsible for designating a Waste Management Coordinator. Coordinator may be the GC Supervisor, GC Project Manager or other member of the GC staff having knowledge of proper waste management procedures and all applicable regulations.
B. Regulatory Requirements: comply with all hauling and disposal regulations of authorities having jurisdiction.
C. The Waste Management Coordinator shall comply with Specification 01 31 19 Project Meetings, Section 3.7.B.1 and conduct a Waste Management Conference at the job site. This conference shall be repeated as necessary as additional trades are added to the Work. The conference shall include but not be limited to the following:
1. Identify the Waste Management Coordinator; provide trade contractors with name, phone, and email information.
2. Review and discuss the Waste Management Plan and the roles of the Coordinator.
3. Review the requirements for documenting and reporting procedures of each type of waste and its disposition.
4. Review procedures for material separation; indicate availability and locations of containers and bins.
5. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
6. Review waste management procedures specific to each trade.

D. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.8. WASTE MANAGEMENT PLAN

A. Develop a plan consisting of waste identification, a waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume. Use the same units of measure throughout the waste management plan.
1. Waste Identification: Indicate anticipated types and quantities of site clearing, demolition waste, and construction waste that will be generated during the execution of this contract. Include assumptions for the estimates.
2. Waste Reduction Work Plan: The work plan shall consist of but not be limited to all of the following:
    a. Identify methods for reducing construction waste. Re-using, framing and forming materials, re-planning material cuts to minimize waste, etc.
    b. Identify what types of materials will be recycled. Provide lists of local companies that receive and/or process the materials. Include names, addresses, and phone numbers.
    c. Identify what types of materials will be disposed of and whether it will be disposed of in a landfill facility or by incineration facility. Provide lists of local companies that receive and/or process the materials. Include names, addresses, and phone numbers.
    d. Identify methods to be used on site for separating waste including all of the following:
        i. Sizes of containers to be used.
        ii. Labels to be used on the containers to identify the type of waste allowed in the container.

iii. Designated locations on the project site for waste material containers.

B. If project requires demolition incorporate the ordinance required (MGO 28.185) Recycling and Reuse Plan into the Waste Management Plan.

C. Provide all of the following for the Waste Management Coordinator:
1. Name, employer, employer address, phone number, and email address of the designated coordinator.
a. The GC shall also provide this information with the required Project Directory Submittal at the beginning of the project.

D. If at the option of the GC, he/she chooses to contract with a Waste Management Disposal Company that allows comingled and unsorted waste materials, the GC shall include with his/her Waste Management Plan the following:
1. Name, address, phone number, state permitting information, and other pertinent information about the disposal company.
2. Documentation from the disposal company indicating company policies and procedures regarding comingled and unsorted waste materials to include:
a. GC responsibilities on the project site.
b. Disposal company procedures for receiving, sorting, recycling, and disposing of comingled and unsorted waste material.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. PLAN IMPLEMENTATION

A. Implement the approved waste management plan. Provide adequate containers, storage space, signage, transportation and other items required to implement the plan during the execution of this contract.

B. The GC and Waste Management Coordinator shall be responsible for monitoring and reporting the status of the Waste Management Plan and shall monitor the waste management practices on site as frequently as needed.

C. Train all workers, sub-contractors, and suppliers on proper waste management procedures as appropriate for the work being conducted on the project site.
1. Distribute the waste management plan to everyone concerned within seven (7) days of submittal approval.
2. Distribute the waste management plan to new workers, sub-contractors, and suppliers when they first appear on the project site.
3. Conduct additional training as needed during the execution of the contract to keep a positive focus on the waste management plan.

D. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent and used facilities.
1. Designate and label specific areas on the project site necessary for separating materials to be salvaged, recycled, reused, donated, and sold.
2. Comply with any specification or regulatory requirements pertaining to dust, dirt, environmental protection, and noise control.

3.2. HAZARDOUS AND TOXIC WASTE

A. The Owner shall be responsible under separate contract for the removal of any asbestos related materials. All other materials shall be removed by the GC.

B. All hazardous and toxic waste shall be separated, stored, and disposed of according to all applicable regulations.

C. All hazardous and toxic materials on site shall have a Material Safety and Data Sheet (MSDS) available that indicates storage requirements, emergency information, and disposal requirements as necessary.

3.3. GENERAL GUIDELINES FOR ALL WASTES

A. Recycle all paper and beverage containers used by workers, sub-contractors, suppliers and visitors to the project site.

B. All revenues, savings, rebates, tax credits, and other such incentives received from recycling, reusing, or salvaging waste materials shall accrue to the GC unless specified otherwise in the contract documents.

C. Separate recyclable, reusable, and salvageable waste from other waste materials, trash, and debris except where Waste Management Disposal Company allows comingled waste materials, see section 1.8.D above.
1. Separate by type in appropriate containers or designated areas according to the approved waste management plan away from the construction area. Do not store within the drip lines of existing trees.

2. Inspect containers and bins frequently for contamination and inappropriately sorted materials. Remove contaminated materials and resort as necessary.
3. Stockpile bulk materials such as sand, topsoil, stone, etc., on site away from the construction area and without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water, and cover to prevent windblown dust. Do not store within the drip lines of existing trees.
4. Whenever possible store items off the ground and/or protect them from the weather.

3.4. GUIDELINES FOR RECYCLABLE, RE-USABLE, AND SALVAGEABLE WASTE

A. The following guidelines is not a complete or all inclusive list and shall be adjusted as needed by the methods and procedures identified in the Waste Management Plan.
B. Asphalt Paving: Break-up into transportable pieces or grind, transport to an authorized recycling facility.
C. Carpet and Pad: Separate carpet and pad scraps, containerize and transport to an authorized recycling facility.
D. Ceiling System Components: Suspended ceiling system components shall be sorted by material type as follows:
   1. Broken, cut, or damaged tiles shall be containerized, transport to an authorized recycling facility.
   2. Damaged, or cut tracks, trim and other metal grid system components shall be sorted with other metals of similar types, palletize, transport to an authorized recycling facility.
E. Clean Fill: When allowed by Division 31 Specifications; concrete, masonry, stone, asphalt pavement, sand and other such materials may be used as clean fill on this project site. The GC shall verify with the Project Architect, Structural Engineer, or Civil Engineer as necessary prior to using any materials as clean fill. Materials shall be processed, placed, and compacted as specified. If not being re-used on site, transport to an authorized recycling facility.
F. Clean Wood Materials: Including but not limited framing cutoffs, wood sheathing or paneling materials, structural or engineered wood products, and pallets or crates. Clean Wood shall be free of paints, stains, oils, preservatives and other such contaminates.
   1. Useable pieces shall be sorted by type and dimension, bundled and transported off site by the GC or returned to the supplier.
   2. Non-useable pieces shall be palletized or containerized, transport to an authorized recycling facility.
   3. Clean, uncontaminated sawdust and wood shavings shall be bagged, transport to an authorized recycling facility.
G. Concrete: Break-up into transportable pieces, remove all reinforcing and other metals, transport to an authorized recycling facility.
H. Glass Products: Shall be sorted by types, do not include light fixture lamps and bulbs. Products broken in shipment shall be returned to the supplier. Broken or cracked items still in frames shall be taped to prevent further breakage and injury to workers. Transport to an authorized recycling facility.
I. Gypsum Board: Stack large clean pieces on wooden pallets or container, store in a dry location, transport to an authorized recycling facility.
J. Light Fixture Lamps and Bulbs: Fluorescent tubes shall be containerized, transport to an authorized recycling facility.
K. Masonry and CMU: Remove all metal reinforcing, anchors, and ties, clean undamaged pieces and neatly stack on pallets, transport damaged pieces to an authorized recycling facility.
L. Metals: Sort metals by type as follows, this does not include piping:
   1. Architectural metals including but not limited to siding, soffit, and roofing panels shall be sorted by material, palletize or bundle as needed and transport to an authorized recycling facility.
   2. Structural steel, sort by size and type; palletize and transport to an authorized recycling facility.
   3. Miscellaneous metals such as aluminum, brass, bronze, etc shall be sorted by type, containerized or palletized as necessary, transport to an authorized recycling facility.
M. Packaging and shipping materials
   1. Cardboard boxes and containers: Breakdown all cardboard boxes and containers into flat sheets. Bundle and store in a dry location until transported for recycling.
   2. Pallets:
      a. Whenever possible require deliveries using pallets to remove them from the project site.
      b. Neatly stack pallets in preparation for reusing them or providing them to other companies for salvage or re-use.
      c. Break down pallets into component wood pieces that comply with the requirements for recycling clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
   3. Crates: Break down crates into component wood pieces that comply with the requirements for recycling clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
   4. Polystyrene Packaging: Separate and bag materials.

N. Piping and conduit: Reduce all piping and conduit to straight lengths, sort and store by size, material and type. Remove supports, hangers, valves, boxes, sprinkler heads, and other such components, sort and store by size, material and type. Transport to authorized recycling facilities according to material types.

O. Roofing: Roofing materials shall be sorted and containerized by type, transport to authorized recycling facilities according to material types.

P. Site-Clearing Waste: Sort all site waste by type.

1. Only stockpile soils types and quantities required for re-use on the project site. All remaining quantities shall be transported off site to an authorized facility that receives such materials.
2. Brush, branches, and trees with no marketable re-use shall be transported to facilities for chipping into mulch.
3. Trees with a marketable re-use shall be salvaged and transported to facilities that specialize in processing trees for future use as wood products.

3.5. GUIDELINES FOR DISPOSAL OF WASTES

A. The following guidelines shall be adjusted as needed by the methods and procedures identified in the Waste Management Plan.

B. Any waste that is contaminated, organic, or cannot be recycled, re-used, or salvaged shall be legally disposed of in an authorized landfill or incinerator. Disposal methods shall follow all applicable regulatory requirements.

C. No waste material of any kind, except those types designated as clean fill in section 3.4 above, shall be allowed to be buried on the project site at any time.

D. No burning of any kind of waste material shall be permitted on this project site at any time.

E. Paint and Stain: Paints, stains, and their containers shall be disposed of as follows:

1. Whenever possible containers should be thoroughly cleaned immediately after emptying and sorted with as appropriate (metal or plastic) for recycling
2. Empty containers, regardless of type or base material, may be disposed of with lids off with general garbage.
3. Latex paint may be placed with general garbage if properly solidified as follows:
   a. Small amounts (an inch or less in can): Remove lids and allow paint to dry out in the can and harden. Protect cans from rain and freezing.
   b. Large amounts (more than one inch): Mix paint with equal amounts of cat litter, stir and allow to completely dry. Alternate method: mix with commercial paint hardener.
4. Oil-based or combustible paints and stains, regardless of liquid or solid, shall be transported to an approved facility that takes such items such as Dane County Clean Sweep Sites.

F. Treated Wood Materials: Treated wood materials including but not limited to wood that has been painted, stained, or chemically treated shall not be recycled or incinerated.

END OF SECTION

SECTION 01 76 00
PROTECTING INSTALLED CONSTRUCTION

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide clear responsibilities, guide lines, and requirements related to providing protection to already installed construction.

B. Already installed construction shall include but not be limited to the following:

1. Any existing site feature such as pavement, curbs, drainage features, utilities, landscaping features (trees, shrubbery, plantings, flagpoles, etc) and other such exterior items not associated with the building whether on or adjacent to the project site.
2. Any existing structure on or adjacent to the project site.
3. Any existing interior work that may be adjacent to the new work including all paths of ingress/egress to areas associated with accessing the Work.
4. Any existing feature of any kind within the public right-of-way that may be on the project site property, adjacent to the project site or across the street from the project site.

C. All contractors shall be familiar with the specifications of their Division of Work for specific requirements on protection of the Work.

D. The requirements noted within this specification do not relieve any contractor of the responsibility for compliance with any code, statute, ordinance, or other such regulatory requirement having jurisdictional authority over these contract documents.

1.2. QUALITY ASSURANCE

A. It shall be the responsibility of every contractor and worker assigned to the project to be diligent in protecting all existing work, and newly installed construction.

B. It shall be the General Contractors' (GC) responsibility under the contract to provide all reasonable protection methods, materials, or precautionary measures required to protect new or existing construction as described in within this specification to the project as a whole.

1. The GC shall be responsible to ensure any damaged new or existing construction is repaired or replaced at no additional cost to the Contract.
2. The GC at his/her discretion may direct other contractors to provide and maintain protection of completed work associated with their Division of Work. I.E.: The carpet installer may be required by the GC to provide carpet protection along traveled paths, ingress/egress, etc after installation.

C. It shall be the responsibility of the GC to ensure that all materials being used to protect installed construction are compatible with, and/or adjacent to, the materials being protected. This shall include but not be limited to the material used as covering, tapes used to fasten protective materials, etc.

1.3. RELATED SPECIFICATIONS

A. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".

1. Use the following link to access the Standard Specifications web page:
   http://www.cityofmadison.com/business/pw/specs.cfm
   a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
   b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.
   c. City Standard Detail Drawings (SDD) may be located from the index in Part VIII.

B. Section 01 60 00 Product Requirements

C. Section 01 74 13 Progress Cleaning

PART 2 - PRODUCTS

2.1. FENCING MATERIALS AND BARRICADES

A. Except where noted in other areas of the construction documents, the responsible contractor shall provide a six foot galvanized chain link fence including full height mesh screen at the project lines as shown on the Civil Drawings. For temporary barricade situations, the responsible contractor may provide one of the following that sufficiently provide a sturdy physical barrier and/or visual barrier as necessary for the intended application.

1. Standard orange construction barrels each with a standard rubber base ring and reflective tape
   a. Provide flashing amber lights as needed to increase night time visibility
2. Steel "T" style fence posts
3. 4'0" high standard orange construction fence
4. Traffic barricades
5. Jersey barriers
6. Other types of fencing or barricades typically used in the construction industry

B. The contractor responsible for providing the fencing materials and barricades shall also be responsible for maintaining them. This shall include but not limited to fixing damaged fencing, standing up barrels that have been knocked over, realigning barrels, and ensuring flashing lights are fully operational at all times.

C. The following fencing and barricade designations, and their use descriptions shall be used throughout this specification to provide uniformity in describing protection requirements.

1. Type A, Jersey Barriers, to be used as permanent blocking devices to deny access to alternate project site entrances or exits.
2. Type B, Traffic Barricades, to be used as temporary blocking devices to deny access to alternate project site entrances or exits.
3. Type C, Construction Barrels without construction fencing shall be used for lane closures, temporary blocking devices to deny access and the protection of single locations (I.E. identify the location of an access structure) that do not require fencing.
4. Type D, Construction Barrels with construction fencing where it becomes necessary to surround an object with a complete visual barricade and it is impractical or unacceptable to install fence posts. The surround shall be constructed in such a manner as to provide a buffer zone around and access to the item being protected.
5. Type E, Steel "T" Fence Posts shall be used at the project lines, as indicated on the Civil Drawings, with six foot galvanized chain link fencing to surround an object with a complete visual barricade and it is practical to install fence posts. The surround shall be constructed in such a manner as to provide a buffer zone around and access to the item being protected. All posts shall be driven installed. Surface mounted posts to only be used for temporary barricades.
6. Type X, Other fencing or barricade types that may be designated and detailed within the construction documents shall use additional alpha numeric designations.

2.2. EROSION CONTROL PROTECTION

A. Refer to City of Madison Standard Specification 210.2 for authorized materials associated with erosion control materials.

2.3. INTERIOR FINISH PROTECTION MATERIALS

A. Except where noted in other areas of the construction documents or this specification the responsible contractor:
   1. Shall not provide the cheapest or least effective method as an effort to meet any protection requirement.
   2. Shall provide materials of sufficient quality, and durability to provide adequate protection based on the seasonal conditions and the anticipated duration at the time the protection will be needed.
   3. Shall provide sufficient quantity of protection material to protect the construction as needed.

B. Prior to installing protective measures the responsible contractor shall propose to the GC, Project Architect (PA) and City Project Manager (CPM) the proposed plan for protection, materials to be used and samples as necessary.
   1. The PA and CPM reserve the right to disapprove any proposed method and/or material and/or make alternate proposals.

PART 3 - EXECUTION

3.1. GENERAL EXECUTION REQUIREMENTS

A. The GC shall be responsible for ensuring all of the following procedures and requirements are implemented as needed for the duration of the Work performed under this contract.

B. The GC shall also be responsible for the following:
   1. Reporting any incident of damage to existing property, right-of-way, or utility to the CPM immediately upon rendering the incident safe, and notifying emergency response teams, and emergency utility crews as needed.
   2. Conduct a site walk through prior to leaving at the end of each day to assess:
      a. Protection measures are properly in place, provide correction actions as necessary.
      b. Note damage to existing completed work and schedule repair/replacement as needed.
   3. Ensure all contractors and workers are being diligent in protecting existing work, and newly installed construction.

3.2. PROTECT ADJACENT PROPERTIES

A. Whenever possible through the design process the City of Madison shall have previously provided notice to adjacent property owners that work will be occurring on or near their property. The City of Madison shall also have obtained any permanent or temporary easements that may be necessary to complete any Work on adjacent properties.

B. It shall be the responsibility of the GC to do the following for all Work under this contract being performed on or adjacent to the property line:
   1. Contact the adjacent property owner and provide him/her with information on the work to be done, equipment to be used, and estimated duration of the work. Information to be updated and communicated to property owner(s) as construction progresses and site conditions change.
      a. If any adjacent property is a rented or leased space the GC shall also make contact and provide the same information to the tenants.
      b. Determine from the owner and/or tenants if there are any concerns for children, pets, special plantings, or other concerns.
   2. Discuss the following with all contractors performing work on or near the property line.
      a. Work to be completed and timeline.
      b. Concerns of adjacent property owners/tenants from item 1 above.
      c. Which protective measures will be necessary to protect adjacent properties and address the concerns of adjacent property owners/tenants.
   3. Ensure all protective measures are placed and maintained during the execution of Work on or adjacent to the property line. Interact with the adjacent property owners/tenants as needed.

C. Any contractor doing work on or adjacent to the property line shall install and maintain any protective measure identified in the contract documents, this specification, or as directed by the GC.

D. The GC shall be responsible for restoring any damage to structure and property located on or adjacent to the property line.
   1. Restoration shall include but not be limited to repair or replacement using like materials and finishes to its original condition or better.
   2. Restoration of landscaping materials shall include watering of any seed, sod, or other planting of any kind for a reasonable period of time to encourage germination and root development.

E. The GC shall keep the CPM informed directly to any issues pertaining to adjacent property owners and tenants.

3.3. PROTECT LANDSCAPING FEATURES

A. Except where specifically stated in other areas of the construction documents the following minimal protection requirements shall apply under this section.
   1. Whenever possible do not install new landscape features until exterior building construction has been completed, equipment such as scaffolding and lifts are no longer needed and have been removed, and heavy equipment operation is no longer required.
   2. Whenever possible remove and temporarily store all existing landscape features such as benches, waste receptacles, signage, and other such features that will be within the area of Work that can be removed.
   3. Landscape features that cannot be removed such as flag poles, light poles, light bollards, etc. shall be protected with Type D fencing for areas on pavement or Type E fencing for areas on soil.
   4. Planting beds shall be protected using Type E fencing around the exposed perimeter of the planting bed as needed.
   5. The City of Madison Standard Specification 107.13 shall apply to all tree protection in and around the project site at all times.

3.4. PROTECT UTILITIES

A. The contractor shall be responsible for notifying all utilities to determine emergency response procedures and protection requirements prior to installing any construction protection.
   1. This includes requesting utility marking through Diggers Hotline.
      a. Call 811 or 1-800-242-8511 to request a public utility locate
      b. For emergency locate call (262) 432-7910 or (877) 500-9592
   2. Contact the Owner and CPM for any available private utility information on the property that may be available prior to calling a private utility locating company.

B. Except where specifically stated in other areas of the construction documents the following minimal protection requirements shall apply under this section.
   1. Hydrants, lamp posts, electrical transformers, and other utility pedestals shall be protected with Type D fencing for areas on pavement or Type E fencing for areas on soil. Fence posts shall be located so as to not be directly over the utility main.
   2. Storm sewer structures in pavement shall have proper inlet protection according to City of Madison Standard Specification 210.1(g) and Type C Construction Barrels when necessary.
   3. Storm sewer structures in turf and other landscaped areas shall have proper inlet protection according to City of Madison Standard Specification 210.1(g) and Type E fencing for areas on soil.
   4. Stormwater management features such as greenways, retention/detention ponds, bio-filtration ponds and other such features shall be properly protected according to the appropriate erosion control measure specified on the Erosion Control Plan. See multiple sections of City of Madison Standard Specification 210.1
      a. For the protection of hard to see items such as structures, castings, inlets, etc. in grassy areas provide Type E fencing for areas on soil.
      c. For the protection of storm water management features having special soils and plants such as bio-filtration ponds provide Type E fencing for areas on soil.
   5. Other structures and covers including but not limited to cleanouts, wiring hand holes, valve boxes, access structures, grease trap structures, etc shall be protected as follows:
      a. Provide Type E fencing for areas on soil.
      b. When paving operations are complete provide a construction barrel or cone near structures as necessary depending on required heavy construction traffic.

3.5. PROTECT PUBLIC RIGHT OF WAY

A. Except where specifically stated in other areas of the construction documents the following minimal protection requirements shall apply under this section.
   1. All public right-of-way (area from behind the sidewalk to the centerline of the street) shall remain open and accessible except during periods of active work. At such times the public right of way shall be properly closed and signed as referenced in City of Madison Standard Specification 107.9.
   2. Bus stops and bus stop structures shall remain accessible at all times.
   3. Traffic signage and traffic signals, traffic control boxes shall be protected with Type D fencing for areas on pavement or Type E fencing for areas on soil.
      a. Protection at traffic signage/signals shall not obstruct the viewing of the sign/signal for its intended purpose at any time.

B. When additional protection for traffic control is required, the use of barricades, guardrails, lane closures and other such procedures will be detailed within the construction documents.
C. When additional protection for overhead sidewalk cover is required the contract documents shall indicate the specific location and structural requirements of the protective structure.

3.6. PROTECT STORED MATERIALS

A. All contractors shall refer to Specification 01 60 00 Product Requirements for all storage and protection requirements of building materials and products delivered to the site.

3.7. PROTECT WORK - EXTERIOR

A. Provide all temporary services that may be required to protect the installed material from heat, cold, humidity, etc, while materials such as concrete, mortar, sealants, paints, etc, are drying and/or curing.
B. Open trenches, pits, and other such excavations shall be properly covered, lined, or shored as needed during periods of inclement weather to prevent the caving of soils onto existing work in progress. Refer to the appropriate specifications and/or regulatory requirements governing this type of work as necessary.
C. Provide adequate protection at all openings with heavy duty tarps, plastic sheathing, or wood framing and sheathing as needed to protect interior work in progress from inclement weather as needed.
D. Protect exterior finishes of all kinds with heavy duty tarps or plastic sheathing as needed while landscaping is being installed through full germination of seeded areas or installation of filter fabric and mulches to keep dust, dirt, and mud off of finished exterior surfaces.
E. Designate specific curb mounting points and provide wood blocking where small vehicles, skid loaders and other such equipment may need access to areas being landscaped.
F. Provide plywood turning pads for skid loaders to turn on to prevent tire marking on new pavement.
G. Do not permit the parking of vehicles with any kind of fluid leaks to park on new pavement.
H. The contractor shall be responsible for cleaning, repairing, or replacing any completed work or work in progress under this specification as deemed necessary by the CPM without additional cost to the contract.

3.8. PROTECT WORK - INTERIOR

A. The GC shall do all of the following:
    1. Provide all temporary services that may be required to protect the installed material from heat, cold, humidity, etc, while materials such as concrete, mortar, sealants, paints, etc, are drying and/or curing.
    2. Provide adequate visual and/or physical protection as needed to protect newly completed interior work such as paint, flooring material, sealants, grouts, etc that may be drying and/or curing.
    3. Provide adequate space and materials for cleaning boots, tool boxes, supplies, and other items coming into the project site once finish work has begun.
    4. Clean dirtied areas and repair/replace damaged areas immediately.
B. The contractors responsible for interior work shall be responsible for protecting their work and finishes from dirt, mud, snow, spills, splatters, and physical damage after installation as follows:
    1. Protect vinyl composite, rubber composite, painted/stained concrete, and tiled flooring as follows:
        a. Define foot traffic areas and protect with Ramboard Temporary Floor Protection products as a minimum basis of design or other protection product(s) compatible with installed flooring product if Ramboard is not compatible. Products to be used shall be new.
            i. Tape all edges, seams, etc with a good quality tape that does not leave sticky residue. Do not allow any debris or other material between the installed flooring and the protection material.
            ii. Repair tears immediately, replace worn areas with like material as necessary.
    2. Protect carpeted areas as follows:
        a. Define foot traffic areas and protect with a minimum of 6mil, clear, polyethylene sheeting 3 feet wide. Products to be used shall be new.
            i. Tape all edges, seams, etc with a good quality tape that does not leave sticky residue. Do not allow any debris or other material between the installed flooring and the protection material.
            ii. Repair tears immediately, replace worn areas with like materials as necessary.
    3. Protect all finished walls in high traffic areas with Ramboard Temporary Wall protection products or approved equal.
            i. Tape all edges, seams, etc with a good quality tape that does not leave sticky residue. Do not allow any debris or other material between the installed flooring and the protection material.

ii. Repair tears immediately, replace worn areas with like materials as necessary.

3. Protect counter tops, cabinets, and other finished surfaces with large sheets of thick cardboard or Ramboard products. Do not allow toolboxes, finish materials, parts and other such items to be placed on finished materials.

C. All protection shall stay in place until the CPM, PA, and GC mutually deem the project is ready for Final Cleaning. The contractors responsible for protecting the work shall be responsible for removing the protection and removing any adhesive residue at that time. Contractors shall only use manufacturer authorized cleaning materials for removing adhesives, etc.

D. Contractors doing work in un-protected areas of finished work shall be required to provide drop cloths and other protection as noted within this specification for the duration of their work.

1. Finished areas shall be sufficiently covered to accommodate all equipment, and materials being used to complete the work being done.
2. Finished areas shall be sufficiently covered to prevent splatters, over spray, etc when doing touch-up work.
3. Contractors who do not provide sufficient protection under this sub-section shall be responsible for any costs associated with cleaning, repairing or replacing already finished construction at no additional cost to the contract.

END OF SECTION

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to clearly define and quantify the requirements associated with closing a City of Madison Public Works Contract for facility related work.

B. All contracts have two distinct but related paths. Each path needs to be properly closed independently in order to close the contract as a whole.

1. Construction closeout is related to closing out all of the Work associated with the construction documents.
   a. It shall be the responsibility of all contractors to be fully aware of the required Work and closeout requirements involved in their individual trades.
2. Contract closeout is related to closing out all of the administrative aspects of the contract in general.
   a. It shall be the responsibility of all contractors to be fully aware of the administrative requirements required by the contract and to provide the supporting documentation required.
3. Construction Closeout must be completed before Contract Closeout can begin.

C. This specification will provide general knowledge associated with the following areas:

1. Construction Closeout Requirements
2. Construction Closeout Procedure
3. Contract Closeout Requirements
4. Contract Closeout Procedure
5. Final Payment and Certificate of Completion

1.2. RELATED SPECIFICATIONS

A. Contractors shall review all references to other specifications including specifications relating to the execution of the Work associated with their Division or Trade.

B.	Section 01 29 76	Progress Payment Procedures
C.	Section 01 31 23	Project Management Web Site
D.	Section 01 32 26	Construction Progress Reporting
E.	Section 01 45 16	Field Quality Control Procedures
F.	Section 01 74 13	Progress Cleaning
G.	Section 01 45 16	Construction Waste Management and Disposal
H.	Section 01 76 00	Protecting Installed Construction
I.	Section 01 78 13	Completion and Correction List
J	Section 01 78 23	Operation and Maintenance Data
K.	Section 01 78 36	Warranties
L.	Section 01 78 39	As-Built Drawings
M.	Section 01 78 43	Spare Parts and Extra Materials
N.	Section 01 79 00	Demonstration and Training
O	Section 01 91 00	Commissioning

P. Other requirements as noted in the contract documents signed by the General Contractor

1.3. DEFINITIONS

A. ***Substantial Compliance***: A letter provided to the City of Madison Building Inspection and signed by the Project Architect indicating that all Work has been completed to a level that would allow Owner Occupancy and that all construction is in compliance with the construction documents. A copy of this letter is also provided to the State of Wisconsin Department of Health and Safety as necessary to clear plan review requirements. This letter does not represent construction closeout.

B. ***Certificate of Occupancy***: The Regulatory letter from the City of Madison Building Inspection Department indicating that all regulatory requirements and inspections have been completed and the building may now be occupied for its intended use. This letter does not represent construction closeout.

C. ***Certificate of Substantial Completion***: A letter provided by the Department of Public Works, signed by the City Engineer indicating that Construction activities are substantially complete. This letter does represent construction closeout and the date of this letter begins the date of the Warranty Period.

D. ***Construction Closeout***: The point in the contract where all contractual requirements associated the execution of the Work as described in the plans, specifications, and other documents have been successfully met and the items described in 1.3.A, .B, and .C above have been completed.

E. ***Final Progress Payment***: The progress payment associated with achieving Construction closeout as described in 1.3.D above. At this point the contractor may request all monies associated with the contract be paid with the exception of held retainage.

F. ***Contract Closeout***: The point in the contract where all contractual requirements associated with the City of Madison, Board of Public Works contract has been successfully met.

G. ***Final Payment***: The final contract payment submittal that may be approved by the City of Madison after all contractual requirements of the Public Works Contract have been met and any remaining monies (retainage) due to the contractor may be released for the Final Payment.

1.4. QUALITY ASSURANCE – CONSTRUCTION CLOSEOUT

A. All contractors shall be responsible for properly executing the construction closeout requirements associated with their Work as described in the specifications governing their Work.

B. The GC shall be responsible for all of the following:

1. Ensuring that all contractors have met the construction closeout requirements associated with their Work.
2. Coordinate the collection of all construction closeout deliverables from all contractors, provide the deliverables to the Project Architect and City Project Manager for review as necessary, and ensure all contractors correct deficiencies of deliverables and resubmit as needed for final acceptance.
3. Ensure all closeout requirements identified in the Construction Closeout Checklist below have been completed as intended by the construction documents.

1.5. QUALITY ASSURANCE – CONTRACT CLOSEOUT

A. The City of Madison, Department of Civil Rights (DCR) monitors contract compliance for construction and procurement contracts to ensure that local, state and federal regulations are followed by contractors working on City of Madison Public Works (PW) projects. DCR will monitor all PW projects from contract award through the final payment at the close of the project. Contractors will be required to submit reporting paperwork throughout the PW project process.

1. Contractors are encouraged to visit the web site identified below for additional information, checklists, forms, and other information provided by DCR as it relates to Contract Compliance.
   http://www.cityofmadison.com/Business/PW/contractCompliance.cfm
2. Questions regarding the process should be directed to parties and offices as identified on the various forms, documents, and instructions or contact:
   City of Madison, Department of Civil Rights
   210 Martin Luther King Jr. Blvd., Room 523
   Madison, WI 53703
   (608) 266-4910

B. All Sub-Contractors have submitted the applicable required documents described in item 1.5.D below to the General Contractor (GC) for Contract Closeout.

C. The GC has submitted the required applicable documents described in item 1.5.D below for all contractors to the appropriate City of Madison Agency per instructions associated with each submittal.

D. The documents required for submittal to the City of Madison for Contract Closeout may include any/all of the items listed below depending on contract type. It is the sole responsibility of all contractors to know and submit the required and complete documentation in a timely fashion.

1. Weekly Payroll Reports
2. Employee Utilization Reports
3. Agent or Subcontractor Affidavit of Compliance with Prevailing Wage Rate Determination
4. Prime Contractor Affidavit of Compliance with Prevailing Wage Rate Determination
5. Documentation required for Small Business Enterprise (SBE) goals
6. Other documents as maybe required or requested through the Finalization Review Process

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. CONSTRUCTION CLOSEOUT CHECKLIST

A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work to provide a complete and comprehensive list of all Construction Closeout Requirements to the GC.
   1. The checklist shall include all items identified within the construction documents that require any of the following (and examples) prior to moving into Contract Closeout Procedures:
      a. Documents indicating a specified level of performance has been achieved, such as:
         i. Test reports of all types
         ii. Startup reports
      b. Required documentation, such as:
         i. As-builts and record drawings
         ii. Operation and maintenance data
      c. Physical items to be turned over to the owner, such as:
         i. Attic stock
         ii. Keys
      d. Required maintenance completed, such as:
         i. Ducts cleaned
         ii. Filters replaced
      e. Commissioning and LEED related items and submittals
      f. Owner and Maintenance Training

B. Each list shall indicate the title of the closeout requirement, the associated specification of the requirement, the required result or deliverable, the responsible contractor(s), and a column to verify the item has been turned in and completed.

C. The GC shall be responsible for all of the following:
   1. Consolidating all the closeout lists into one master Construction Closeout Checklist.
      a. The checklist shall be in a tabular data format similar to the sample below
   2. Upload the completed checklist to the Contract Closeout-Miscellaneous Documents Library on the Project Management Web Site for review.
   3. Resubmit the checklist as needed after initial reviews have been completed.

D. The GC shall work with all contractors to amend the Construction Closeout Checklist throughout the execution of the project based on changes and modifications as necessary.

Title	Specification	Description	Responsibility	Completed
Quality Management Observation Reports	01 45 16	All QMO reports have been properly responded to, reviewed and closed by the CPM.	All, GC	
As-Built Drawings	01 78 39	As-Built drawings have been reviewed and accepted per the specification	All, GC	
Testing and Balancing of HVAC	23 09 23	Provide final TnB reports indicating design performance has been achieved	HVAC	

3.2. CONSTRUCTION CLOSEOUT REQUIREMENTS

A. The timely submittal or completion of closeout requirements shall go hand in hand with the Progress Payment Milestone Schedule that can be found in Specification 01 29 76 Progress Payments. No payments shall be made until all requirements for that payment have been met.
   1. The GC and all major Subcontractors, PA, and CPM, shall review all requirements for Construction/Contract Closeout during two (2) special meetings.

a. The first meeting shall be held at the 50% Contract Total Payment milestone. This meeting shall discuss the requirements associated with various construction/contract closeout documentation and events when they are due with respect to progress payments.
b. The second meeting shall be held at the 70% Contract Total Payment milestone. This meeting shall review the contractors progress regarding the closeout checklist, begin making plans for upcoming deadlines such as scheduling training, where to put attic stock, and when they are due with respect to progress payments.

2. The GC, PA, and CPM, shall utilize the Construction Closeout checklist to ensure that all construction closeout requirements have been met.

3.3. CONSTRUCTION CLOSEOUT PROCEDURE

A. Upon successful completion and final acceptance of all Construction Closeout Requirements the GC may submit to the CPM and PA the request for Final Progress Payment (100% contract total, less retainage).
B. The PA will confirm with the design consultants, CPM, and other City of Madison staff that all requirements of the Work have been completed and will do the following:
   1. Approve the final progress payment application
   2. Provide the required signed payment documents to the CPM
   3. Provide the required Letter of Substantial Compliance to the following as required:
      a. State Safety and Building Division
      b. Local Building Inspection office
      c. GC
      d. CPM
C. The CPM shall draft the City Letter of Substantial Completion for signature by the City Engineer. This letter shall state any of the following that may still be tied to the contract and/or warranty:
   1. Indicate that the date of the letter shall also be the beginning of the Warranty period.
   2. Indicate any allowed due outs, reasons for them, and anticipated dates of finalization.
      a. QMO issues such as off season testing of equipment
      b. Off season training of equipment
D. The GC and all subcontractors shall finalize all warranty letters associated with their Work using the date noted on the City Letter of Substantial Completion, and provide the CPM with all warranties as described in Specification 01 78 36 Warranties. Upon receipt and final approval of the Warranties the CPM may initiate final processing of the Final Progress Payment (100% contract total, less retainage).

3.4. CONTRACT CLOSEOUT REQUIREMENTS

A. The GC and all sub-contractors shall follow all requirements associated with documenting contract compliance and provide documentation as required or requested by DCR or PW staff. All contractors are encouraged to stay current with submissions of the following documentation:
   1. Weekly Payroll Reports no later than the Progress Payment equal to 50% of the contract total.
   2. Employee Utilization Reports
   3. Agent or Subcontractor Affidavit of Compliance with Prevailing Wage Rate Determination
   4. Prime Contractor Affidavit of Compliance with Prevailing Wage Rate Determination
   5. Documentation required for Small Business Enterprise (SBE) goals
   6. Other documents as maybe required or requested through the Finalization Review Process
B. Near the Progress Payment equal to 80% of the contract total the GC shall request in writing a Finalization Review. At that time DCR or PW staff shall prepare a report of all contract documentation submitted to date. A list of missing items or outstanding issues will be emailed to the GC. <u>No additional follow-up will be generated by DCR or PW Staff</u>.

3.5. CONTRACT CLOSEOUT PROCEDURE

A. The Contract Closeout Procedure will not begin until the Construction Closeout Procedure has been completed.
B. When the GC feels he/she has successfully met all of the Contract Closeout Requirements associated with Section 3.3 above the GC may submit to the request for Final Payment to the CPM.
C. The CPM shall sign and submit the Final Payment request for processing.
D. DCR and PW staff shall do a complete review of all documentation associated with item 3.3.A above.
E. The GC shall be notified directly by DCR or PW Staff of any documentation that may still be missing, have incomplete information, or other outstanding issues. It shall be the responsibility of the GC to continue follow-up with DCR and PW staff until all documentation has been successfully submitted and accepted.

F. When all required documentation associated with Contract Closeout has been successfully submitted and accepted by DCR and PW Staff the City of Madison shall process the Final Payment of any remaining monies including retainage.

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SECTION 01 78 13
COMPLETION AND CORRECTION LIST

PART 1 – GENERAL

1.1. SUMMARY

A. The City of Madison has developed a multi-faceted Quality Management Program that begins with contract signing and runs through contract closeout to ensure the best quality materials, workmanship, and product are delivered for the contracted Work.

1. The Progress Management Web Site is a Construction Management tool that provides contractors, consultants, and staff a single on-line location for the daily operations and progression of the Work.
2. The Quality Management Observation (QMO) is an ongoing observation of the construction process as it progresses. The City of Madison does not use a “Punch List” or “Corrections List” as it is typically known throughout the construction industry. The QMO process acts as an “in progress punch list”. Work identified as not in compliance with the contract documents by the Owner, Owner Representatives, Owner Consultants, etc. shall be resolved immediately at the Contractor’s expense. Unresolved issues will be subject to withholding of progress payment(s) until completed.
3. Very stringent expectations are tied to Construction Closeout and Contract Closeout procedures. Specific milestones throughout the project need to be met and the milestones are tied to the Progress Payment Schedule.

B. All contractors shall be required to review the specifications identified in Section 1.2 below, and other related specifications identified therein to become familiar with the terminology and expectations of this City of Madison Public Works contract.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 45 16 Field Quality Control Procedures
D. Section 01 77 00 Closeout Procedures

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide clear responsibilities and guide lines related to providing well documented and complete Operation and Maintenance (O&M) Data related to general facility use, equipment, systems, finishes, and materials to City of Madison Staff (Owner, Owner Representatives, Maintenance, and Custodial Personnel) as needed.

B. Operation and Maintenance Data shall apply to both of the following categories except where specific requirements are noted under their separate titles as follows:

1. Operation and Maintenance Data: Generally shall mean the owner manual that provides information on start-up, shut-down, operation, troubleshooting, maintenance, parts, and other such documentation as it pertains to all equipment and systems installed under the Work.
2. Use and Care instructions: Where applicable use and care instructions shall also be considered O&M for such things as flooring, tile, partitions, and other such finishes and trim related items, installed under the Work.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 77 00 Closeout Procedures
D. Section 01 78 13 Completion and Correction List
E. Section 01 78 19 Maintenance Contracts
F. Section 01 78 36 Warranties
G. Section 01 79 00 Demonstration and Training
H. Section 01 91 00 Commissioning
I. Other Divisions and Specifications that may address more specifically the requirements for O&M Data.

1.3. QUALITY ASSURANCE

A. All O&M Data shall meet the requirements identified in Section 1.4 below.

B. All contractors shall provide O&M Data for each piece of equipment, system, or finish installed during the installation of the Work. O&M Data shall be provided to the General Contractor (GC) for verification and submittal.

C. The GC shall be responsible for receiving all required O&M Data files from all contractors for verifying that all files submitted meet the requirements in Section 1.4 below.

1.4. O&M DATA REQUIREMENTS

A. O&M Data shall be provided in digital PDF format as follows:

1. PDF files shall be complete first generation consumer useable editions of PDF documents as provided by any of the following:
   a. Product manufacturer
   b. Supplier of product
   c. Product manufacturer internet site

2. Acceptable PDF files shall have the following functionality:
    a. Word searchable
    b. Key areas are bookmarked
    c. Table of Contents and/or Index linked to content is preferred whenever possible.
3. Scanned printed material, with word searchable capabilities, saved as a PDF, is not acceptable and will be rejected without further review.

B. O&M Data shall include but not be limited to the following manufacturers' published information as appropriate for the equipment, system, material, or finish:
1. Installation instructions
2. Parts lists, assembly diagrams, explosion diagrams
3. Wiring diagrams
4. Start-up, shut-down, troubleshooting and other related operation procedures
5. Lubrication, testing, parts replacement, and other such maintenance procedures
6. General use, care, and cleaning instructions
7. Special precautions and safety requirements
8. A list of certified equipment vendors, service companies, parts suppliers including company name, address, and phone number
9. A list of the recommended spare parts to have on hand at all times
10. A list by type of all recommended lubes, oils, packing material, and other maintenance supplies
11. Copies of final test reports, balance reports, and other related documentation
12. Warranty information for equipment and systems

1.5. O&M DATA SUBMITTALS

A. O&M Data shall be prepared as identified in this specification and shall be submitted for review as per the schedule identified in Specification Section 01 29 76, Progress Payment Procedures.

B. O&M Data Draft submittals will be reviewed for content, procedure, and compliance only. A general critique with recommendations for improvement will be made but re-submittals will not be required.

C. O&M Data Final submittals will be reviewed for content, procedure, and compliance. Re-submittals will be required until such time as each submittal is accepted.

<u>NOTE:</u> *Acceptance of O&M Data Final submittals is required to be complete prior to scheduling and conducting owner related training and construction closeout.*

<u>PART 2 – PRODUCTS – THIS SECTION NOT USED</u>

<u>PART 3 - EXECUTION</u>

3.1. O&M DATA PREPARATION - GENERAL

A. All contractors shall prepare O&M Data for draft and final submission as follows:
1. Obtain digital PDF files for each piece of equipment, system, material or finish as described in Sections 1.4.A.1 and 1.4.A.2 above.
2. Verify that all information as described in Section 1.4.B above is included with the PDF file. Obtain missing information as necessary for a complete submittal.

B. Rename each individual PDF file as follows.
1. Do not use special characters such as #, %, &, /, etc. These characters are reserved by the Project Management Web Site software the City of Madison uses; however the under-score (or under-bar) '_' is an allowed character.
2. Use the following format and examples for renaming your file:
    a. Format: ***Equipment name_What_MADISON PUBLIC MARKET_Contract number_Year***
        i. *Equipment Name* represents the name of any equipment, system, material or finish as designated in the Contract Documents.
        ii. *What* represents what the file is about
        iii. *MADISON PUBLIC MARKET* represents the title of the project or contract. A shortened version of the title may be identified by the City Project Manager to be used by all contractors.
        iv. *Contract number* is the specific identification number the Work was bid under and appears on the plan set title sheet and in each sheet title block
        v. *Year* represents the year the contract will be closed out

b. Examples of file names
i. AHU 2_Operation Manual_Fire Admin_1234_2015
ii. CPT 2_Use and Care_MPD West_9876_2011

C. All contractors shall submit the completed digital PDF files to the GC in sufficient time for the GC to meet the O&M Data submission deadlines as described in Specification Section 01 29 76, Progress Payment Procedures.

D. O&M Data shall be submitted and reviewed as described in sections 3.2 and 3.3 below.

3.2. O&M DATA DRAFT SUBMITTAL

A. All contractors shall prepare and submit the following for an O&M Data Draft review submittal:
1. Prepare three (3) complete O&M Data file samples as described in section 3.1 above.
2. Review all specifications within his/her Division of Work and prepare a complete O&M Data checklist listing all equipment, systems, materials, or finishes. Checklist shall be in tabular form similar to the example below and shall indicate the title (and plan identifier when applicable) of the O&M Data, the associated specification, and a column to verify the item has been turned in and completed.

B. The GC shall be required to review all contractors' samples and checklists for compliance with this specification and shall return any to the originating contractor that are insufficient for re-submittal.
1. When acceptable to the GC, he/she shall upload each O&M Data draft submittal file to the O&M Draft library on the Project Management Web Site.

C. The Project Architect, City Project Manager, CxA, Consulting Staffs and Owner Representatives shall review the O&M Data draft submittals and checklist within fifteen 15 working days as follows:
1. Provide general critique comments by Division on O&M Data samples submitted. Critique is intended to provide all contractors with information on strengths and weaknesses of their submittals.
a. Re-submittal of the O&M Data samples will not be required.
2. Review in detail the O&M Data Checklist for completeness. Provide comments as needed.
a. Re-submittal of the O&M Checklist will be required until accepted.

Title	Specification	Completed
Overhead Door Operator	08 36 00	
Air Handling Unit (AHU-3)	23 00 00	
Water Heater (WH-1)	22 30 00	

3.3. O&M DATA FINAL SUBMITTAL

A. All contractors shall prepare and submit the following for an O&M Data Final review submittal:
1. Prepare complete O&M Data files as described in Section 3.1 above according to their approved checklist as described in Section 3.2 above.
2. Submit completed checklist and all final O&M Data files to the GC for final submittal review.

B. The GC shall be required to spot check all contractors' submittals for completeness against their checklists and for compliance with this specification and shall return any to the originating contractor that are insufficient for re-submittal.
1. When acceptable to the GC, he/she shall upload each O&M Data final submittal file to the O&M Final library on the Project Management Web Site.

C. The Project Architect, City Project Manager, CxA, Consulting Staffs and Owner Representatives shall review the O&M Data final submittals and checklist within fifteen (15) working days as follows:
1. Review the files submitted against the checklist and request any missing files through the GC.
2. Review in detail all of the O&M Data files for completeness.
a. Submittals shall be accepted or rejected as individual PDF files.
b. Contractors shall re-submit entire O&M submittal if any portion is rejected or incomplete.

3.4. CONSTRUCTION CLOSEOUT

A. All contractors shall review Specification 01 77 00, Closeout Procedures and Specification 01 79 00 Demonstration and Training.
1. Acceptance of all final O&M Data submittals is required prior to scheduling Demonstration and Training Sessions.
2. Completion of all Demonstration and Training Sessions is required to receive the Substantial Compliance for Occupancy Certificate, and to begin Construction Closeout procedures.

1 END OF SECTION

SECTION 01 78 36
WARRANTIES

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide clear responsibilities and guide lines related to providing all Warranties and Guarantees related to the Work, workmanship, materials, equipment, and other such items required by the Construction Documents.

B. Manufacturers' disclaimers and limitations on product warranties do not relieve any contractor of the warranty on the Work that includes the product.

C. Manufacturers' disclaimers and limitations on product warranties do not relieve suppliers, manufacturers and any contractor required to provide special warranties under the contract documents.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 77 00 Closeout Procedures
D. Section 01 78 23 Operation and Maintenance Data
E. Section 01 91 00 Commissioning
F. Other Divisions and Specifications that may address more specifically the requirements for Warranties related to the installation of all items and equipment installed under the execution of the Work.

1.3. DEFINITIONS

A. See specification 01 77 00 for the definitions of the following terms that may also be used in this specification:
1. Substantial Compliance
2. Certificate of Occupancy
3. Certificate of Substantial Completion
4. Construction Closeout
5. Contract Closeout

B. Emergency Repair: The Owner or Owner Representative reserves the right to make emergency repairs as required to keep equipment or materials in operation or to prevent damage to property and injury to persons without voiding the contractors warranty or bond or relieving the contractor of his/her responsibilities during the warranty period.

C. Installer: The company or contractor hired to install a finished product that was manufactured and supplied specifically for the Work within this contract. The Installer may or may not be the same company that supplied the product. See the definition for supplier.

D. Supplier: Any company that makes a specific finished product for the Work from information within the Contract Documents. Examples of suppliers would include custom cabinets, steel stairs and railings, etc. A supplier would not be a company that distributes items manufactured by others such as an electrical or plumbing supplier.

E. Warranty: A written guarantee from the manufacturer to the owner on the integrity of a product and its installation, and the manufacturers' responsibility to repair or replace the defective product or components within a specified time from the date of ownership. Warranty may also be used interchangeably with Guarantee. The following warranty types may be part of any specification within the Work associated with the Construction Documents:

1. Expressed Warranty: A warranty that provides specific repair or replacement for covered components of a product over a specified length of time.
2. Implied Warranty: A warranty that is not stated explicitly by a seller or manufacturer that the product is merchantable and fit for the intended purpose.
3. Standard Product Warranty: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner. Standard warranties may be for any amount of time but shall not be for anything less than one (1) year from the warranty date.
4. Special Warranty: A written warranty required by the Contract Documents either to extend the time limit provided under a standard warranty or to provide greater rights to the Owner.

F. Warranty Date: The effective date that begins all warranty periods required for products, installations, and work-manship associated with the execution of the Work for this contract. The Warranty Date shall be set by the CPM.

G. Related Damages and Losses: When correcting failed or damaged Warranted Work, remove and reinstall (or replace if necessary) the construction that has been damaged as a result of the failure or the construction that must be removed and replaced to obtain access for the correction of Warranted Work.

H. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected reinstate the warranty by a new written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation unless specifically noted otherwise in a specification.

I. Replacement Cost: All costs that may be associated with Work being replaced under warranty including but not limited to the following:
1. Related damages and losses
2. Labor, material and equipment
3. Permits and inspection fees
4. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its anticipated useful service life.

J. Replacement Work: All materials, products, required labor, and equipment necessary to replace failed or damaged warranted to an acceptable condition that complies with the requirements of the original Construction Documents.

K. Owners Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, and remedies.
1. Rejection of Warranties: The Owner reserves the right to reject any warranty and to limit the selection of products with warranties not in conflict with the requirements of the contract documents.
2. Where the Contract Documents require a Special Warranty or similar commitment on the Work or product, the Owner reserves the right to refuse acceptance of the Work until the Contractor presents evidence the entities required to countersign such required commitments have done so.

1.4. GENERAL CONTRACTORS RESPONSIBILITIES

A. The General Contractor (GC) shall be responsible to remedy, at his/her expense, any defect in the Work and any damage to City owned or controlled real or personal property when the damage is a result of:
1. The GC's failure to conform to Contract Document requirements.
   a. Any substitutions not properly approved and authorized may be considered defective.
2. Any defect in workmanship, materials, equipment, or design furnished by the GC or Sub-contractors.

B. All warranties as described in this specification and these Contract Documents shall take effect on the date established by the CPM, as noted in Section 1.3F above.
1. All warranties shall remain in effect for one (1) year thereafter unless specifically stated otherwise in the Contract Documents or where standard manufacturer warranties are greater.

C. The GC's warranty with respect to Work repaired or replaced, including restored or replaced Work due to damage, will run for one (1) year from the date of Owner Acceptance of said repair or replacement.
1. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its anticipated useful service life.

D. Warranty Response
1. See Section 3.5 of this specification.

PART 2 – PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. WARRANTY CHECKLIST

A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work to provide a complete and comprehensive list of all Warranty Requirements to the GC.

B. Each list shall indicate the title (and plan identifier when applicable) of the warranted item, the associated specification of the warranted item, the terms of the warranty (years), and a column to verify the item has been turned in and completed.

C. The GC shall be responsible for all of the following:

1. Consolidating all the warranty lists into one master Warranty Checklist.
   a. The checklist shall be in a tabular data format similar to the sample below.
2. Upload the completed checklist to the Submittal Library on the Project Management Web Site for review. See Specification 01 33 23 Submittals for more information on this procedure.
3. Resubmit the schedule as needed after initial reviews have been completed.

D. The GC shall work with all contractors to amend the Warranty Checklist throughout the execution of the project based on changes and modifications as necessary.

Title	Specification	Terms	Completed
Overhead Door Operator	08 36 00	MFR 2yr	
Exterior Bench and Trash Receptacles	12 93 00	MFR 3 year warranty on finish	
Kitchen Sink (SK-1)	22 42 00	MFR 5 year	
Disposal (D-1)	22 42 00	MFR 7 year parts and in-home service	
Toilet (WC-1)	22 42 00	MFR 1 year limited	

3.2. LETTERS OF WARRANTY

A. All letters of warranty shall be in a typed letter format and provide the following information:

1. The letter shall be on official company stationary including company name, address, and phone number.
2. Indicate MADISON PUBLIC MARKET, contract number, and contract address the warranty is for on the reference line.
3. Provide a description of the warranty(ies) being provided.
   a. Include Division, Trade, or Specification information as necessary.
   b. Only combine warranties of related Divisional Work together. Create new letters for additional Divisions as necessary.
4. Indicate the effective Warranty Date. As noted in Section1.3.F above, the Warranty Date shall be the date the Certificate of Substantial Completion was signed by the City Engineer.
5. Contractor Letters of Warranty shall only be signed by a principal officer of the company.
6. After signing the letter provide the GC with a high quality color scanned image in PDF format and the original signed letter.

B. The GC shall be responsible for the Final Warranty submittal as identified in Section 3.4 below.

C. The GC shall obtain letters of warranty from all of the following:

1. The General Contractor shall provide warranty letters for all Work that was self performed under the contract documents, identify all trades or Divisions of Work.
2. All Sub-contractors shall provide warranty letters for Work performed under the contract documents; identify all trades or Divisions of Work.
3. Suppliers, as required by other specifications within the Construction Documents where the manufacture of a specific product unique to the Work of this contract was required.
   a. The terms and conditions of the Supplier Letter of Warranty shall be as defined by the specifications associated with the Work but shall not be less than the industry standard of repair, or replace defective materials and workmanship within one (1) year of the warranty date.
   b. When the supplier is also the installer a single written letter may be submitted identifying both the warranty for the manufacture of the product and the warranty for the installation of the product.
4. Installers as required by other specifications within the Construction Documents where the installation of a specific product unique to the Work of this contract was required.

1. The terms and conditions of the Installer Letter of Warranty shall be as defined by the specifications associated with the Work but shall not be less than the industry standard of repair, or replace defective materials and workmanship associated with the installation of the product within one (1) year of the warranty date.

5. Special Letters of Warranty shall be required from any contractor, supplier, installer or manufacturer who agrees to provide warranty services required by any Division Specification in excess of their Standard Product Warranty.

3.3. STANDARD PRODUCT WARRANTY

A. All contractors shall be responsible for collecting and providing copies of all standard product warranties for commercially available products purchased and installed under this contract.

B. Only one copy of the manufacturers' standard warranty needs to be submitted as representative for all quantities of the same model number used throughout the Work.

C. Provide the manufacturers certificate, letter, or other standard documentation for each Standard Product Warranty submitted as follows:

1. Whenever possible a PDF version of the document shall be used.
   a. If a PDF version is used all additional information shall be completed using simple PDF editing tools such as text boxes, highlight, etc.
   b. If a PDF version is not available and an original document is furnished the additional information shall be neatly hand written and highlighted on the document in such a fashion so that it does not obscure any part of the written warranty.
2. Provide the following additional information on each warranty document:
   a. Contract warranty date.
   b. Provide the manufacturer name and model number of the product if not specified within the warranty.
      i. Where the manufacturer name and model number is specified within the warranty it shall be highlighted for visibility.
   c. Provide the plan identifier (LAV-1, WC-2, etc) when applicable.

D. Each completed warranty shall be saved as a digital PDF. The file shall be named using the specification number and item description. I.E. 22 42 00 Toilet (WC-1).pdf
   a. Where an original certificate was furnished provide a high quality colored scan of the completed document with the additional information. Save the scanned image in PDF format and use the same naming convention as indicated above.

E. Provide all PDF files and any original documents to the GC for final consolidation to be provided to the Owner.

3.4. FINAL WARRANTY SUBMITTAL

A. The GC shall receive all required warranties (digital PDF and any original documents) from all contractors, suppliers, installers and manufacturers.

B. The GC shall inventory all received warranties with the Warranty Submittal List to ensure all required warranties have been received and all warranty periods are correct according to the specifications.

C. Provide with each Operation and Maintenance Manual a complete copy of any associated warranty.

D. Scan all warranties into a single organized electronic PDF file as follows:
1. Organize the PDF file into an orderly sequence based on the table of contents of the Specifications.
2. Provide a typed Table of Contents for the entire file at the front of the document.
3. Provide bookmarks and links to each individual PDF to enable quick navigation through the PDF document.

E. Upload the warranty submittal to the appropriate document library on the Project Management Web Site for review by the PA and CPM.

F. Correct any deficiencies or omissions and resubmit as necessary.

3.5. WARRANTY NOTIFICATION, RESPONSE, EXECUTION AND FOLLOW-UP

A. Warranty Notification:
1. The City of Madison, Project Management Web Site, uses an email notification system for all warranty related issues. The GC will be required to provide, and keep current during the warranty period, a minimum of two (2) email addresses and phone numbers of current employees to receive email notifications and provide response regarding Work associated with these construction documents.
   a. In the event a Warranty Issue is deemed by the City of Madison to be an emergency, the GC shall first receive a phone call with a follow-up email from the Project Management Web Site.

b. The Contract Closeout-Warranty Issue Library on the Project Management Web Site uses a form for each warranty issue that is logged into the system.
   i. The GC shall open each warranty issue form, review the issue description and any attached documentation or photos.
   ii. The GC shall also notify any other sub-contractor, supplier, or installer that may be required to review the warranty issue.

B. Warranty Response:
1. The GC shall upon notification by the City of Madison provide warranty response as follows:
   a. Critical Systems or equipment: Where damage to equipment and other building components, or injury to personnel is probable provide immediate emergency shut-down information and an on-site response team as soon as possible but in no case shall on-site response exceed 24 hours.
   b. For non-critical responses where damage or injury is unlikely provide on-site response no later than the next business day.
   c. Where Technical Assistance support is part of the written warranty provide all assistance necessary via phone, text, or internet systems as indicated by the warranty. If issues cannot be resolved provide on-site response no later than the next business day.
   d. If the request cannot be supported in sufficient time as outlined above the Owner (or Owner Representative) reserves the right to contact other contractors or service companies having similar capability to expedite the repair or replacement and shall invoice all associated costs to the Owner back to the GC.

C. Warranty Execution:
1. The GC shall provide all repairs or replacements as necessary to restore broken or damaged Work to the original level of acceptance as intended by the Contract Documents.
   a. Provide all materials, equipment, products, and labor necessary to complete the repair or replacement associated with the Warranty Issue.
   b. Provide all cleaning services as may be required before, during, and after the repair or replacement as per Specification 01 74 13 Progress Cleaning.
   c. Provide any protection necessary for existing construction as per Specification 01 76 00 Protecting Installed Construction
   d. Provide new letters of warranty when required.

D. Warranty Follow-up:
1. Logged Warranty Issues:
   a. The GC shall provide complete documented responses of all logged Warranty Issues. Responses shall provide a description of work completed, by who, inclusive dates, and photos of completed or repaired work.
      i. Provide call back response if work is not acceptable.
   b. The City Project Manager shall review the submitted response documentation and do a field inspection if necessary.
      i. If work is not acceptable, contact GC to review details and expectations of the repair as needed.
      ii. If work is acceptable close the Warranty Issue.
2. Quarterly Warranty Reviews:
   a. The GC shall be responsible for scheduling quarterly on-site review with all of the following:
      i. City Project Manager, and other City staff as needed
      ii. Owner and Owner Tenant Representative
      iii. Commissioning Agent (CxA)
      iv. Plumbing, Heating, Electrical Sub-contractors
      v. Other Sub-contractors that may be responsible for open Warranty issues
   b. Quarterly reviews shall be scheduled at 3 months, 6 months, and 11 months after the effective date of the warranty. The review meetings shall:
      i. Review the status of all open Warranty Issues, determine course of action and estimated date of completion.
      ii. In the appropriate quarter, provide shut-down, start-up, testing, and training of off-season equipment as required by the contract documents.
      iii. The 11th month review shall review all open Warranty Issues, final plan for resolution, and all Warranty Issues where a new letter of warranty may have been issued.

END OF SECTION

SECTION 01 78 39
AS-BUILT DRAWINGS

PART 1 – GENERAL

1.1. SUMMARY

A. This specification is intended to provide clear guidelines and identify the responsibilities of all contractors as they pertain to City of Madison contract procedures regarding the accurate recording of the Work associated with the execution of this contract. This shall include but not be limited to work that will be hidden, concealed, or buried.

B. Each contractor shall be responsible for maintaining an accurate record of all installations, locations, and changes to the contract documents during the execution of this contract as it may relate to their specific division or trade.

C. The General Contractor (GC) shall be responsible for ensuring all contractors provide as-built record information to the Master As-Built Document Set as described in this specification.

1.2. RELATED SPECIFICAITONS

A. 00 31 21 Survey Information
B. 01 26 13 Request for Information
C. 01 31 23 Construction Bulletin
D. 01 32 33 Photographic Documentation
E. 01 26 63 Change Orders
F. 01 29 76 Progress Payment Procedures
G. 01 31 23 Project Management Web Site
H. 01 33 23 Submittals
I. 01 77 00 Closeout Procedures
J 01 91 00 Commissioning
K. Other Divisions and Specifications that may address more specifically the requirements for field recording the installation of all items associated with the execution of this contract by Division or Trade.

1.3. RELATED DOCUMENTS

A. Other related documents shall include but not be limited to the following:
1. Bidding documents including drawings, specifications, and addenda.
2. Required regulatory documents of conditional approval.
3. Field orders, verbal or written by inspectors having regulatory jurisdiction.
4. Shop drawings and installation drawings.

1.4. PERFORMANCE REQUIREMENTS

A. The GC shall be responsible for maintaining the “Master As-Built Document Set” in the job trailer at all times during the execution of this contract. This document set shall include all of the following:
1. Master As-Built Plan Set
2. Master As-Built Specification Set
3. Other Document Sets

B. The GC shall designate one person of the GC staff to be responsible for maintaining the Master As-Built Document Set at the job trailer. This shall include, posting updates, revisions, deletions and the monitoring of all contractors posting as-built information as described in this specification.

C. All contractors shall use this specification as a general guideline regarding the requirements for documenting their completed Work. Contractors shall explicitly follow additional specification requirements within their own Division of Trade as it may apply to this specification.

1.5. QUALITY ASSURANCE

A. The GC shall be responsible for all of the following:

a. Spot checking all sub-contractors field documents to insure daily information is being recorded as work progresses.

b. Discuss as-built recording to the plan set at weekly job meetings with all sub-contractors on site.

c. Schedule time with sub-contractors in the job trailer for recording as-built information to the plan set.

d. Insure that all sub-contractors are providing clear and accurate information to the plan set in a neat and organized manner.

e. Insure sub-contractors who have completed work have finalized recording all as-built information to the plan set before releasing them from the project site.

B. The Project Architect, the City Project Manager, Commissioning Agent and other design team staff will perform random checks of the Master As-Built Document Set during the execution of this contract to ensure as-built information is being recorded in a timely fashion as the Work progresses. An updated and current Master As-Built Document Set is a stipulation for approval of the progress payment.

PART 2 – PRODUCTS

2.1. OFFICE SUPPLIES

A. The GC shall provide a sufficient supply of office products in the job trailer at all times for all contractors to use in recording as-built information into the plan set. This shall include but not be limited to the following:

a. Red ink pens, medium point. Pens that bleed through paper, markers, and felt tips will not be accepted.

b. The use of highlighters is acceptable. Assign colors to various trades for consistency in recording information.

c. Straight edges of various lengths for drawing dimension, extension and other lines.

d. Civil and Architectural scales

e. Clear transparent, non-yellowing, single sided tape.

f. Correction tape or correction fluid for correcting small errors.

PART 3 - EXECUTION

3.1. FIELD DOCUMENT AS-BUILTS

A. The GC and all Sub-contractors shall be responsible for keeping their own field set of as-built documents including plans, specifications and published changes.

B. Field sets shall be kept dry and in good condition at all times.

C. No Work shall be buried, covered, or hidden, by any additional Work, regardless of Contractor or Trade, until locations of all materials and equipment has been properly documented as described below.

D. All contractors shall be required to record the following as-built information:

a. Notes on the daily installation of materials and equipment.

b. Sketches, corrections, and markups indicating final location, positioning, and arrangement of materials and equipment such as pipes, conduits, valves, cleanouts, pull boxes and other such items. Note all final locations on plan sheets, indicate dimension off identifiable building features. Riser diagrams need only be corrected for significant changes in locations, routing or configuration.

i. The use of photographs in lieu of hand drawn sketches is acceptable.

ii. Photos shall be taken according to Specification 01 32 33 Photographic Documentation

iii. Print photo and markup with dimensions or notes as necessary.

c. Identify by the use of existing plan symbology and notes the size, type, quantity, and use as applicable of materials such as pipes, valves, conduits, etc.

d. Note whether horizontal runs are below slab or above ceiling, include dimensions above or below finished floor elevation.

E. All contractors shall be responsible for transferring the information from their field set of documents to the Master As-Built Plan Set kept in the GC job trailer. See Section 3.3.D. below for the proper procedure.

F. All contractors shall update the GC Master Plan Set as often as necessary, but not less than once per work week.

3.2. SITE SURVEY AS-BUILT

A. The Land Surveyor Sub-Contractor shall provide digital as-built information including but not be limited to the following:

a. For underground buried utility laterals and services of all types locate all of the following that may apply:

i. Connection points at all mains
ii. Storm discharge points to open air
iii. All corners and bends regardless of angle, large radius sweeps shall have multiple point locations sufficient to define the sweep.
iv. All vertical drops
v. All wells
vi. Private buried utilities such as buried electrical cables, irrigation systems, etc.
v. Other information that may need to be located in the future by the owner prior to digging

b. Record all surface features including but not limited to the following:

i. Building corners, pavement edges, and other permanent structural features.
ii. All surface covers for inlets, catch basins, cleanouts, access structures, curb stops and other such devices.
iii. Other permanent surface features such as hydrants, lamp posts, and other permanent site amenities.

c. The following data shall be recorded while locating items in sub-sections 3.2.a and 3.2.b above:

i. Flow lines at both ends of pipes
ii. Pipe sizes and material types
iii. Rim elevations for all covers
iv. Sump elevations and invert elevations of all structures
v. Spot elevations for all pads, driveways, walks, stoops, and floors

B. The Surveyor shall provide the final digital as-built on a media and in a format specified in Specification 00 31 21 Survey Information to the GC for turn in to the Project Architect and the Civil Engineer.

C. The Surveyor shall provide two printed as-built site plans to the GC for inclusion in the Master As-Built Plan Set as follows:

1. One sheet to show all features (but not contour information) with text neatly organized for each item identified.
2. One sheet showing contours, contour labels, and features from item 1 above, but with no additional text.

3.3. MASTER AS-BUILT DOCUMENT SET

A. The GC shall be responsible for maintaining the Master As-Built Document Set in the job trailer at all times.

1. The Master As-Built Plan Set (Plan Set) shall begin with one complete bid set of drawings and any additional sheets that were supplied by published addenda during the bidding process. The cover sheet shall be titled as the “Master As-Built Plan Set” in large bold red letters approximately 2” in height and shall not be used for any other purpose.

a. The Plan Set shall be kept dry, legible, and in good condition at all times.

b. The Plan Set shall be kept up to date with new revisions within two (2) working days of supplemental drawings being issued. Revisions shall be posted as follows:

i. Insert new, revised sheets into the plan set. Void old sheets but do not remove them from the plan set. Indicate date received and what document (RFI, CB, CO, etc) caused the change.
ii. Insert new, revised individual details into the plan set. Void old details, tape new details over the old details with a “tape hinge” to allow them to be viewed. Indicate date received and what document (RFI, CB, CO, etc) caused the change.
iii. Add new details in appropriate white space on relevant sheets. If no space is available use the back side of the previous sheet or insert a new sheet. Indicate date received and what document (RFI, CB, CO, etc) caused the change.

c. The Plan Set shall be available at anytime for easy reference during progress meetings and for emergency location information of new work already completed.

2. The Master As-Built Specification Set (Spec Set) shall begin with one complete bid set of specifications and any additional specifications that were supplied by published addenda during the bidding process. The Spec Set shall be provided in three "D" ring type binders of sufficient thickness to accommodate the specification set. Multiple binders are allowed as necessary. Label the front cover and binding edge with "Master As-Built Specifications" in bold red letters. Provide other information as necessary to distinguish the contents of multi-volume sets.
   a. The Spec Set shall be kept dry, legible, and in good condition at all times.
   b. The Spec Set shall be kept up to date with new revisions within two (2) working days of supplemental drawings being issued.
   c. The Spec Set shall be available at anytime for easy reference during progress meetings.
3. Other Document Sets may be kept at the GCs option in three "D" ring type binders of sufficient thickness to accommodate the documentation. Other documentation sets may include but not be limited to RFIs, CBs, COs, etc.

C. The Land Surveyor Sub-Contractor shall be required to use digital surveying for all exterior site surveying, and provide deliverable digital as-builts as specified in Specification 00 31 21 Survey Information. As soon as practical the surveyor shall provide the GC with a preliminary copy of installed buried utilities for inclusion with the plan set in the job trailer. The surveyor shall provide final digital as builts as per section 3.2 above.

D. All contractors shall be responsible for updating the Plan Set from their field sets at least once per work week. Updates shall include but not be limited to the following procedures:
   a. All updates shall be done only in red ink. Place a "cloud" around small areas of correction to call attention to the change.
   b. Whenever possible place general work notes, field sketches, supplemental details, photos, and other such information on the reverse side of the preceding sheet. Installation notes including dates shall be kept neatly organized in chronological order as necessary.
   c. Accurately locate items on the plan set as follows:
      i. For items that are located as dimensioned provide a check mark or circle indicating the dimension was verified.
      ii. For items that are within 5 feet of the location indicated on the plans leave as shown and:
         - Provide correct dimensions to existing dimension strings or,
         - Accurately locate with new dimension strings
      iii. For items that are more than 5 feet from the location indicated on the plans
         - Accurately draw the items in the new location as installed and,
         - Accurately locate with new dimension strings and,
         - Note that the existing location is void.
   d. Include dimensioned locations for items that will be buried, concealed, or hidden in the ground, under floors, in walls or above ceilings.
      i. Dimensions shall be pulled from identifiable building features, not from centers of columns or other buried features.
      ii. When necessary pull more dimensions as needed from opposing directions to properly locate single items.

3.4. AS-BUILT REVIEW AND ACCEPTANCE

A. The GC shall provide the Master As-Built Plan Set to the Project Architect (PA), the City Project Manager (CPM), the Commissioning Agent (CxA) and other design team staff for content review prior to the Progress Payment Milestone indicated in Specification 01 29 76 Progress Payment Procedures. The submitted plan set shall include the digital survey information produced under Section 3.2 above.
   1. If the plan set is not approved:
      a. The PA and CPM shall only be required to generalize deficiencies by trade there shall be no requirement or expectation to generate a "punch list" of required corrections.
      b. The GC and Sub-contractors as necessary shall be responsible for inspecting the installation and correcting the drawings as needed.
      c. The GC shall re-submit the plan set for review.
   2. If the plan set is approved the PA shall take possession of the plan set to be used in providing the owner with digital CAD record drawings. Upon completion of transferring the information to CAD the PA shall provide the Owner with CAD record drawings, record PDFs, and the Master As-Built Plan Set.

3.5. CHANGES AFTER ACCEPTANCE

A. No Contractor shall be responsible for making changes to the As-Built record documents after acceptance by the PA and CPM except when necessitated by changes resulting from any Work made by the Contractor as part of his/her guarantee.

END OF SECTION

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SECTION 01 78 43
SPARE PARTS AND EXTRA MATERIALS

PART 1 – GENERAL

1.1. SUMMARY

A. This specification is intended to provide clear guidelines and identify the responsibilities of all contractors as they pertain to City of Madison contract procedures regarding spare parts, special tools, special materials, and extra materials.

B. Each contractor shall be responsible for knowing the specific requirements of their Division Specifications as they may relate to the general information provided in this specification.

C. The General Contractor (GC) shall be responsible for ensuring all contractors provide spare parts and extra materials as described in this specification.

1.2. RELATED SPECIFICAITONS

A. 01 29 76 Progress Payment Procedures

B. 01 31 23 Project Management Web Site

C. 01 77 00 Closeout Procedures

D. Other Divisions and Specifications that may address more specifically how to proceed with spare parts, special tools, special materials, and extra materials.

1.3. DEFINITIONS

A. Spare Parts: Any component of a product or assembly that comes pre-packaged or was specially ordered for the explicit use of the product or assembly. This shall include but not be limited to fastening devices, mounting brackets, replacement parts, wheels, pulleys, wiring, alternate assembly pieces, etc.

B. Special Tools: Any tool of any kind that was pre-packaged or specially ordered, and is required to be used for the installation or maintenance of an installed product or assembly as part of this contract.

C. Special Materials: Any oil, lubricant, glue, touch-up paint, or other such material that comes pre-packaged or was specially ordered and is required to be used for the installation or maintenance of an installed product or assembly as part of this contract.

D. Extra Materials (Attic Stock): Any surplus materials in new and useable condition that was installed a part of this contract. Attic Stock shall include but not be limited to the following: ceiling tiles, paint, stain, floor coverings, ceramic tiles, light bulbs/lamps, filters, strainers, etc. Attic Stock shall include partially opened bulk items and additional unopened quantities as directed by other specifications.

1.4. PERFORMANCE REQUIREMENTS

A. All contractors shall be responsible for consolidating spare parts, special tools, special materials, and attic stock as it pertains to the specific Work within their Division or Trade.

B. All contractors shall use this specification as a general guideline regarding the requirements for turning spare parts, special tools, special materials, and attic stock over to the owner. Contractors shall explicitly follow specification requirements within their own Division of Trade.

1.5. QUALITY ASSURANCE

A. The General Contractor (GC) shall be responsible for all of the following:

1. Coordinate the location for and the delivery of all spare parts, special tools, special materials, and attic stock being provided by all contractors under this contract to one centralized location as designated by the Owner.
2. Verify that all items being delivered are:
   a. Clean, new, and in a usable condition.
   b. Properly sealed, protected, and labeled
   c. Properly documented

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. PACKAGING

A. Whenever possible all surplus items should remain in their original packaging such as parts envelopes.
B. Package small parts in re-sealable plastic bags (Ziploc) or envelopes with clasp fasteners. Do not use envelopes that seal with glue or tape envelopes closed. Do not leave packaging unsealed.
C. Package like parts together for products or assemblies. I.E. keep all spare parts for flushometers together.
D. Many small packages may be grouped together into a larger container by trade.
E. Do not use unrelated boxes or containers for packaging spare items. I.E. do not use a light fixture box for spare breakers, or flushometers parts.

3.2. LABELING

A. Whenever possible the original labeling indicating part numbers and other pertinent information shall remain on the original packaging.
B. If original labeling is not available the contractor shall label all parts and packages using tape or labels and permanent black markers. Tape or labels being used shall absorb the permanent marker without bleeding or allowing ink to be smeared or rubbed off.
C. Labels shall include the name of the product or equipment the item belongs to, part number and/or name, and any other information that would assist maintenance personnel in identifying the piece and related product.
D. Labels shall include plan or specification designations (WC-1, LAV-3, DF-2, CPT-1, etc) that identify the particular product or finish material it represents.
E. Labels for parts stored in clear re-sealable plastic bags may be placed inside the bag. Label shall face out and be able to be read from one side. Multiple bags shall be numbered individually for identification.
F. Label the outside of large containers with the trade name (Plumbing, Electrical, etc).

3.3. INVENTORY

A. All contractors shall provide the GC with complete inventories of all spare parts, special tools, special materials, and attic stock that they are providing at the end of the contract. The inventories shall be organized as follows:
   1. The cover sheet shall indicate the Contractors name, address, phone number, identify that the document is the “Spare Parts and Extra Materials Inventory”, and identify the Division or Trade the inventory is for.
   2. Provide an inventory in a tabular format of all items being provided under this and other specifications. The minimum information to be provided for each item on the inventory shall be as follows:
      a. Bag or container number, all items of one bag or container shall be grouped together on the inventory
      b. Item description
      c. Item size (if applicable)
      d. Total quantity provided
      e. Identify if item is a spare part, tool, special material, or attic stock
B. The GC shall consolidate inventories from all sub-contractors into one tabular data sheet organized by Division or Trade of Work.
   1. Upon completing the consolidated list the GC shall upload the completed inventory to the Contract Closeout-Attic Stock Library on the Project Management Web Site.
   2. The GC shall notify the Project Architect and City Project Manager that the scans have been uploaded.
   3. Consulting Staff and Owner Staff shall review the inventories prior to Final Review to verify that minimum required quantities have been met. Deficiencies shall be noted and returned back to the GC for corrective action.

3.4. STORAGE

A. Prior to the 80% Progress Payment milestone the GC shall coordinate with the City Project Manager and Maintenance Personnel where spare parts, special tools, special materials, and attic stock shall be stored.

B. The GC shall instruct all contractors as to the location and proper storage procedures.

C. The GC shall be responsible for ensuring the storage area is kept neat and orderly as follows:

1. Like items are stored together by material, product, or trade as necessary.
2. Liquids are stored in sealable containers and the lids have been properly installed to prevent drying out, spillage, etc.
3. All labels are clearly visible and provide the required information.

D. Large items shall be stored so as not to damage other items. Do not stack heavy items or items with distinct shapes/outlines on softer items that may get crushed or imprinted.

3.5. CLOSEOUT PROCEDURE

A. Prior to the 90% Progress Payment milestone the GC shall review all attic stock already stored by the contractors to ensure the following:

1. Materials are stored in the proper location(s).
2. All boxes, containers and items are properly labeled according to the submitted/approved inventory.
3. Quantities are correct according to the submitted/approved inventory.

B. The GC shall ensure that all deficiencies are corrected prior to conducting Demonstration and Training Sessions.

C. The GC shall review with Maintenance Staff all inventories and labeling during the scheduled Demonstration and Training Sessions.

D. Any discrepancies associated with Attic Stock shall be resolved and verified prior to the CPM releasing the 90% CT progress payment.

END OF SECTION

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SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide clear responsibilities and guidelines related to providing Demonstration and Training (D&T) Sessions related to general facility use, equipment, systems, finishes, and materials to City of Madison Staff (Owner, Owner Representatives, Maintenance, and Custodial Personnel) as needed.

B. All D&T shall be coordinated through the General Contractor (GC), Project Architect (PA) and City Project Manager (CPM), and will be based on or customized to the needs of City of Madison Staff being trained. New equipment and systems may have complete D&T sessions as described in this specification while equipment or systems staff is familiar with may have sessions more focused on maintenance only.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 78 13 Completion and Correction List
C. Section 01 78 19 Maintenance Contracts
D. Section 01 78 23 Operation and Maintenance Data
E. Section 01 78 36 Warranties
F. Section 01 78 39 As-Built Drawings
G. Section 01 78 43 Spare Parts and Extra Materials
H Section 01 91 00 Commissioning
I. Other Divisions and Specifications that may address more specifically the requirements for D&T sessions related to the installation of all items and equipment installed under the execution of the Work.

1.3. QUALITY ASSURANCE

A. All contractors shall have the responsibility of preparing for and conducting D&T sessions as determined by this and other Division or Trade related specifications, Owner Operation and Maintenance Manuals, and other such documentation related to the Work.

B. The GC shall have responsibility for:

1. Ensuring that all contractors required to conduct a D&T session have successfully completed all of the following:
    a. Turned in all required documentation for review and documentation has been approved/accepted prior to scheduling D&T sessions.
    b. Other required documentation as needed is available and ready for use during the D&T session.
    c. All systems have been started, tested, and running as per appropriate specification and/or manufacturers recommendations prior to scheduling D&T sessions.
    d. All contractors are sufficiently prepared for their D&T session
    e. Documents the D&T session including date, time, contractor and company name, attendees and other information regarding the session
2. Organizing the coordination and scheduling of all D&T sessions between all contractors and the appropriate representatives of the Owner. These representatives may include any of the following depending on the Work of the Contract:

a. Owner – end users
b. Facility Maintenance personnel
   i. Facility general operation procedures including custodial services
   ii. Electrical
   iii. Mechanical
   iv. Plumbing
   v. Site
c. Information Technology (IT) Department
d. Traffic Engineering – Radio Shop
e. Architects, Engineers and Facility Management staff as project completion overview

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL REQUIREMENTS

A. The GC shall develop a specific D&T plan to be scheduled and conducted as described below but no sooner than the meeting discussed in 3.2.A.2 below.

C. The GC shall not schedule D&T sessions to preclude required personnel from attending multiple sessions.

3.2. COORDINATING AND SCHEDULING THE TRAINING

A. The GC, PA, CxA and CPM, shall review all Training and Demonstration requirements during two (2) special meetings.
   1. The first meeting shall be held at the 50% Contract Total Payment. During this meeting the following shall be discussed:
      a. Preliminary schedule of training dates to be completed prior to beginning construction closeout.
      b. List of documentation and items that need to be completed and available before and during the training session.
      c. Who (Owner, Maintenance, etc) will be attending what training session(s).
   2. The second meeting shall be held at the 80% Contract Total Payment. This meeting shall review due outs that have not yet been completed for the 90% Contract Total Payment and the requirements necessary for Construction Closeout. All Demonstration and Training sessions shall be completed prior to receiving the 90% progress payment and beginning Construction Closeout Procedures (see Specification 01 77 00).
      a. This does not include any requirement associated with off season equipment preparation and/or demonstration and Training Sessions.

B. All of the Construction Work shall be operationally ready prior to conducting training as follows:
   1. All contractors shall have their As-Built Drawing Records available for reviewing locations of system components during training.
   2. All final and approved Operations and Maintenance Data shall be completed no less than two (2) full weeks prior to the scheduled training.
   3. All systems shall have been started, functionally tested, balanced, and fully operational, and all piping and equipment labeling complete at least two (2) days prior to the scheduled training.
      a. Seasonal equipment shall not be trained out of season. Contractors having seasonal equipment shall work with the GC and CPM for coordinating additional training sessions as appropriate for seasonal equipment.

C. Correction list items that prevent a piece of equipment or system from being fully operational for training shall be corrected prior to conducting the training.

3.3. TRAINING OBJECTIVES

A. For each piece of equipment or system installed train on the following objectives/topics as applicable:
   1. System design, concept, and capabilities
   2. Review of related contractor as-built drawings
   3. Facility walkthrough to identify key components of the system
   4. System operation and programming including weekly, monthly, annual test procedures
   5. System maintenance requirements
   6. System troubleshooting procedures
   7. Testing, inspection, and reporting requirements associated with any regulatory requirements
   8. Identification of any correction list items still outstanding

9. Review of system documentation including the following:
    a. Operation and maintenance data
    b. Warranties
    c. Valve charts, tags, and pipe identification markers

B. For each piece of specialty equipment train on the following objectives/topics as applicable:
1. Manufacturers operations instructions
2. Manufacturers use and care instructions
3. Manufacturers maintenance and troubleshooting instructions
4. System operation and programming including weekly, monthly, annual test procedures
5. Identification of any correction list items still outstanding
6. Review of system documentation including the following:
    a. Operation and maintenance data
    b. Warranties

C. End User Orientation
1. Facility walkthrough
2. Security and emergency features
3. General facility operation procedures

D. Facility General Use and Custodial Services – if requested
1. Facility walkthrough
2. Security and emergency features
3. General facility operation procedures
4. Care and maintenance of specialty items, finishes, etc as requested
5. Attic stock inventory and material designations

3.4. DEMONSTRATION AND TRAINING PROGRAM PREPARATION

A. Each contractor having a responsibility for providing D&T sessions shall meet with the GC, CPM, and other City Staff as needed to review the extent of the Training Objectives in section 3.3 above needed for each piece of equipment, system, finish, etc. This meeting shall occur no less than four (4) weeks prior to the anticipated training session.

B. The contractor shall use the information from item 3.4.A above to prepare a formal training program for each piece of equipment or system based on the Training Objectives in 3.3 above.
1. The formal training program shall include the following information:
    a. Session title
    b. List of systems, equipment, use, care, etc to be covered during the session
    c. Provide the following for each systems, equipment, use, care, etc to be covered during the session
        i. Name and affiliation of each instructor to be used. As needed and discretion of the Owner the GC to require attendance by the installing technician, installing Contractor and the appropriate trade or manufacturer's representative.
        ii. Qualifications of each instructor to be used. Practical building operation expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment as installed in this project is required by the training personnel. If Owner determines training was not adequate, the training shall be repeated until acceptable to Owner.
        iii. A checklist of all documentation and system/equipment requirements necessary to complete a successful training session and the current status of each
        iv. Any additional documents, training aids, video or other items to be used to complete the training
        v. Any special requirements or needs associated with item iv above to complete the training
    d. The intended audience for the training
    e. The approximate duration of each objective or topic to be covered
2. Submit the completed training program to the GC for review and approval by the PA and CPM.

C. The PA and CPM shall work with staff as necessary to ensure all points of anticipated training needs have been met. The PA and CPM will approve the program as submitted or recommend changes for re-submittal as necessary.

3.5. CONDUCTING A DEMONSTRATION AND TRAINING SESSION

A. All contractors shall conduct their required D&T Sessions as follows:
1. Begin with a classroom session
    a. Provide a sign in sheet indicating all training to be conducted, instructors, etc.

b. Provide an overview of the training to be conducted including the approximate schedule.

2. Conduct a general walk-through of the site.
   a. Point out locations of various equipment, valves, charts, and other related items.
   b. Use the Division or Trade As-Built record drawings to indicate locations of hidden or buried items.
3. Provide a demonstration of general equipment/system operation including using the O&M manual.
   a. Startup and shutdown procedures.
   b. Normal operational levels as depicted by any gauges, software, etc.
   c. Indicate warning devices, signs etc. and demonstrate emergency shut-down procedures.
4. Provide a demonstration of all owner level maintenance using the O&M manual.
   a. Indicate frequency of maintenance.
   b. Provide and review all spare parts, special tools, and special materials.
5. Provide and review all spare parts, special tools, special materials, or attic stock as applicable.
6. While conducting D&T sessions:
   a. Allow hands on training whenever practical.
   b. Answer questions promptly
   c. Repeat demonstrations and procedures as necessary.

B. Within two (2) working days of completing the D&T session the contractor responsible for the session shall turn-in any documentation generated including the sign in roster to the GC.

C. The GC shall turn over all training documentation to the PA and CPM upon completion of D&T sessions.

D. Re-schedule any training that has been determined to be inadequate or inappropriate for any reason including but not limited to any of the following;
   1. Unqualified instructor
   2. System installation incomplete or untested to the specifications
   3. Equipment failure during demonstration
   4. Un-expected cancellation

3.6. CLOSEOUT PROCEDURE

A. Prior to receiving the 90% Progress payment the GC shall:
   1. Verify with the PA and CPM that each Demonstration and Training Session was conducted properly and according to the submitted plan.
   2. Any required “Off Season” equipment testing, balancing, and Demonstration and Training Sessions have been tentatively scheduled with the GC, necessary sub-contractors, instructors and Owner/Owner Representatives as necessary.

END OF SECTION

SECTION 01 81 13
SUSTAINABLE DESIGN REQUIREMENTS – LEED FOR NEW CONSTRUCTION V3

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Comply with Wisconsin Commercial Building Codes/International Building Code (IBC).

C. Comply with Americans with Disabilities Architectural Guidelines, and ICC/ANSI A117.1-Latest Edition.

D. Comply with USGBC LEED prerequisites and credits needed for Project to obtain “LEED Gold certification based on USGBC’s LEED 2009 for New Construction and Major Renovations”.

1.2 SUMMARY

A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain “LEED Gold certification based on USGBC’s LEED-NC (New Construction and Major Renovations)” Version 3.0.

1. Other LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
2. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.
3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
4. Specific requirements for LEED are included in greater detail in other Sections.

B. Related Sections: Divisions 01 through 32 Sections for LEED requirements specific to the work of each of these Sections. Requirements may or may not include reference to LEED.

1.3 DEFINITIONS

A. Albedo (a.k.a. solar reflectance): The ratio of the reflected electromagnetic energy to the incoming electromagnetic energy.

B. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.

C. Emissivity (a.k.a. infrared emittance): A parameter between 0 and 1 that indicates the ability of a material to shed infrared radiation.

D. LEED: Leadership in Energy and Environmental Design. Green Building Rating System representing the US Green Building Council's effort to provide a national standard for what constitutes a "green building". The standard requires quantitative and technical documentation to demonstrate compliance with goals described in the US Green Building Council's Green Building Rating System, Version 3.0.

E. Hydrofluorocarbons (HFCs): Refrigerants used in building equipment that do not deplete the stratospheric ozone layer.

F. Locally-Manufactured (for LEED™ Materials Credit 5): Refers to the final assembly of components into the building product that is furnished and installed by the trades people. For example, if the hardware comes from Seoul, South Korea, the lumber from Vancouver, British Columbia, and the joist is assembled in Kent Washington, then the location of the final assembly is Kent, Washington.

G. Post-Consumer Recycled Content: The percentage of waste material by weight available from consumer use incorporated into a building material.

H. Pre-consumer (aka Post-Industrial Recycled) Content: The percentage of waste material by weight available from industrial use incorporated into a building material. Post-industrial recyclable materials are different from industrial scrap, a by-product of industrial processes that can easily be reused as a feedstock.

I. Potable Water: Water that is suitable for drinking and is supplied from wells or municipal water systems.

J. Recycling: The collection, reprocessing, marketing and use of materials that were recovered or diverted from the solid waste stream. Note that LEED uses the term "pre-consumer" rather than "post-industrial." Also note that when manufacturers and trade associations use the term "post- industrial" it often includes spills, scraps, and damaged and surplus materials that are fed back into the same manufacturing process and that these materials are not considered recycled content by the LEED rating systems.

K. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

L. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.

M. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

N. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

O. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles from Project site. Manufacturing refers to the final assembly of components into the building product that is installed at Project site.

P. Regionally Extracted and Manufactured Materials: Regionally manufactured materials made from raw materials that are extracted, harvested, or recovered within a radius of 500 miles from Project site.

Q. Solar Reflectance: See "Albedo."

R. Sustainable Forestry: The practice of managing forest resources to meet the long-term product needs of humans while maintaining the biodiversity of forested landscapes. The primary goal is to restore, enhance, and sustain a full range of forest values, both economic and ecological.

S. Type A Finishes: Material and finishes with potential for short-term levels of off gassing from chemicals inherent in their manufacturing process, or which are applied in form requiring vehicles or carriers for spreading which release high level of particulate matter in process of installation and/or curing. Including, but not limited to:

1. Composite wood products, specifically including particleboard from which millwork, wood paneling, doors, or furniture may be fabricated.
2. Adhesives, sealants, and glazing compounds, specifically those with petrochemical vehicles or carriers.
3. Wood preservatives, finishes, and paint.

4. Control and/or expansion joint fillers.
5. Hard finishes requiring adhesive installation.
6. Gypsum board and associated finish processes.

T. Type B Finishes: Fuzzy material and finishes which are woven, fibrous, or porous in nature and tend to adsorb chemicals off-gassed by Type A finishes or may be adversely affected by particulates. These materials become "sink" for deleterious substances which may be released much later, or collectors of contaminants that may promote subsequent bacterial growth. Including, but not limited to:
1. Carpeting and padding.
2. Fabric wallcovering.
3. Insulation exposed to air stream.
4. Acoustic ceiling materials.
5. Fabric covered acoustic wall panels.
6. Upholstered furnishings.
7. Materials that can be categorized as both Type A and Type B.

U. Ventilation: The process of supplying and removing air to and from interior spaces by natural or mechanical means.

V. Volatile organic compounds (VOCs): Chemical compounds based on carbon and hydrogen structures that are vaporized at room temperatures. VOCs are one type of indoor air contaminant.

W. Waste Materials: Large and small pieces of materials indicated which are excess to contract requirements and generally include materials salvaged from existing construction and items of trimmings, cuttings, and damaged goods resulting from new installations which cannot be effectively used in Work.

X. LEED Project Administrator: LEED Certified Professional hired by the project owner to review LEED submittals.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the project's LEED certification application. Document responses as informational submittals.

1.5 ACTION SUBMITTALS

A. General: Submit additional LEED submittals required by other Specification Sections.

B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.

C. LEED Submittals: Submit LEED related information under a separate Tab within each product submittal. The LEED submittal shall include:
1. Summary Sheet: A summary, on General Contractors letterhead, of all LEED information requested in specifications shall include:
   a. MADISON PUBLIC MARKET.
   b. LEED Submittal List: A list of all materials being submitted. For products com- posed of multiple materials the submittal shall include a list of all materials composing the product.
   c. For Products in Divisions 2 - 10, include the following information:
      i. Material costs, for each material on the LEED submittal list, excluding labor costs, delivery cost, cost of installation, as well as profit and overhead.
      ii. The preconsumer and post-consumer recycled content of each material on the LEED submittal list.
      iii. List of all material manufacturing locations.
      iv. Provide distance between manufacturing and construction site.
   d. All other LEED information required in specification.
2. Manufacturer's literature with information highlighted that confirm the figures used in the summary report.
   a. If a range is used in the manufacturer's literature, the summary report shall use the lowest number in the range.
   b. For VOC Submissions: Submit MSDS sheets or manufacturer's literature with VOC figure highlighted.

D. Project Material Costs Data: Provide a statement, on Contractor's letterhead, documenting the total material for the project. Include a spreadsheet tallying the material cost for all materials specified in Divisions 2 - 32. The

total in the material cost data will be used in the LEED Online template to be completed by the Contractor as the actual material cost of the project.

E. LEED Action Plan: Provide preliminary submittal within 30 days of Notice to Proceed that contains:
   1. Example spreadsheets for each construction credit identified in this section.
   2. Contact information for Contractor's LEED coordinators.
   3. Brief description of how the following requirements will be met.
      a. Credit SS Prerequisite 1: Construction Activities Pollution Prevention complying with Section 31 25 00, Erosion Control.
      b. Credit MR c2: Construction Waste Management complying with Section 01 74 19 Construction Waste Management and Disposal. Include a sample spreadsheet showing how the tipping information is going to be recorded to comply with LEED requirements.
      c. Credit MR c4: Recycled content information including methods of collection and recording.
      d. Credit MR c5: Manufacturing location information including methods of collection and recording.
      e. Credit MR c6: Rapidly renewable materials information including methods of collection recording.
      f. Credit MR c7: Certified wood product incorporated into the construction of the facility and a description of how certified wood information, including the chain-of-custody letters are going to be collected and recorded.
      g. EQ c4.1 – 4.4: VOC information including methods of collection and recording required LEED information.
   4. After CPM approval of the Preliminary Action Plan the Contractor shall update the plan monthly with LEED information collected to date and be submitted as part of a monthly progress report.

F. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing the actual construction and purchasing activities with LEED requirements for the following:
   1. Credit SS Prerequisite 1: Construction Activities Pollution Prevention.
   2. Credit MR c2: Construction Waste Management.
   3. Credit MR c4: Recycled content for materials specified in Divisions 2 - 32.
   4. Credit MR c5 Regional Materials: Distance to manufacturing for materials specified in Divisions 2 - 32.
   5. Credit MR c6: Rapidly Renewable Materials: Content and cost for materials specified in Divisions 2- 32.
   6. Credit MR c7: Certified wood products including the chain-of-custody letters identifying the forest of origin.
   7. IEQ c4.1 – 4.4: VOC information.

G. LEED Documentation Online Submittals: The Contractor shall be responsible for completing the following LEED submissions using the LEED online tool for credit submission to USGBC. The LEED Project Administrator will determine if the information prepared by the Contractor is satisfactory for USGBC submission.
   1. Credit EA 5: Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over a period of time of not less than one year of post-construction occupancy.
   2. Credit MR 2: Comply with Division 1 Section "Construction Waste Management and Disposal."
   3. Credit MR 4: Product data and certification letter from product manufacturers indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating material costs for each product having recycled content.
   4. Credit MR 5: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   5. Credit MR 7: Product data and chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.
   6. Credit IEQ 3.1:
      1. Construction indoor-air-quality management plan.
      2. Product data for temporary filtration media.
      3. Product data for filtration media used during occupancy.
      4. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.
   7. Credit IEQ 3.2: Construction IAQ Plan: Before Occupancy.
      1. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.

2. Report from testing and inspecting agency indicating results of indoor-air- quality testing and documentation showing compliance with indoor-air-quality testing procedures and requirements.

8. Credit IEQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subject D (EPA Method 24).
9. Credit IEQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subject D (EPA Method 24).
10. Credit IEQ 4.4: Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For LEED coordinator.

B. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
1. Furniture.
2. Plumbing.
3. Mechanical.
4. Electrical.
5. Specialty items such as elevators and equipment.
6. Wood-based construction materials.

C. LEED Action Plans: Provide preliminary submittals within 30 days of date established for the Notice of Award indicating how the following requirements will be met:
1. Credit MR 2: Waste management plan complying with Section 01 74 19 "Construction Waste Management and Disposal."
2. Credit MR 4: List of proposed materials with recycled content. Indicate cost, post- consumer recycled content, and pre-consumer recycled content for each product having recycled content.
3. Credit MR 5: List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.
4. Credit MR 7: List of proposed certified wood products. Indicate each product containing certified wood, including its source and cost of certified wood products.
5. Credit IEQ 3.1: Construction indoor-air-quality management plan.

D. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
1. Credit MR 2: Waste reduction progress reports complying with Section 01 74 19 "Construction Waste Management and Disposal."
2. Credit MR 4: Recycled content.
3. Credit MR 5: Regional materials.
4. Credit MR 7: Certified wood products.

1.7 QUALITY ASSURANCE

A. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

1.8 CONTRACTOR RESPONSIBILITIES

A. This project has been registered with USGBC. The Contractor shall provide all necessary documentation for LEED v3.0 certification in accordance with the specifications. Format and content of all construction documentation must be in accordance with the LEED Reference Guide requirements for supporting data required in event of USGBC audit of the particular credit. Con- tractor is required to coordinate all requirements to assure assembled data is acceptable to USGBC and respond to USGBC requests for additional construction data in the course of preparing the project for certification.

PART 2 – PRODUCTS

2.1 MATERIALS, GENERAL

A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated.

2.2 RECYCLED CONTENT OF MATERIALS

A. Credit MR 4.1: Building materials shall have recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of [10] percent of cost of materials used for Project.

1. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-comsumer recycled comtent plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
2. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
3. Do not include plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation.

2.3 REGIONAL MATERIALS

A. Credit MR 5: Provide a minimum of 10 percent of building materials (by cost) that are regional materials.

2.4 RAPIDLY RENEWABLE MATERIALS

A. Credit MR 6: Provide a minimum of 2.5 percent of the building materials (by cost) that are rapidly renewable materials.

2.5 CERTIFIED WOOD

A. Credit MR 7: Not less than 50 percent (by cost) of wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1. Wood-based materials include, but are not limited to, the following materials when made from wood, engineered wood products, or wood-based panel products:
   a. Rough carpentry.
   b. Miscellaneous carpentry.
   c. Finish carpentry.
   d. Architectural woodwork.

2.6 LOW-EMITTING MATERIALS

A. Credit IEQ 4.1: For field applications that are inside the weatherproofing system, use adhesives and sealants shall comply with the following limits for VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Metal to Metal Adhesives: 30 g/L.
3. Adhesives for Porous Materials (Except Wood): 50 g/L.
4. Plastic Foam Adhesives: 50 g/L.
5. Carpet Adhesives: 50 g/L.
6. Carpet Pad Adhesives: 50 g/L.
7. VCT and Asphalt Tile Adhesives: 50 g/L.
8. Cove Base Adhesives: 50 g/L.
9. Gypsum Board and Panel Adhesives: 50 g/L.
10. Rubber Floor Adhesives: 60 g/L.
11. Ceramic Tile Adhesives: 65 g/L.
12. Multipurpose Construction Adhesives: 70 g/L.
13. Contact Adhesive: 80 g/L.
14. Structural Wood Member Adhesive: 140 g/L.
15. Special Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, rubber or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
16. Top and Trim Adhesive: 250 g/L.
17. ABS Welding Compounds: 325 g/L.
18. CPVC Welding Compounds: 490 g/L.
19. PVC Welding Compounds: 510 g/L.

20. Adhesive Primer for Plastic: 550 g/L.
21. Plastic Cement Welding Compounds: 350 g/L.
22. ABS Welding Compounds: 400 g/L.
23. CPVC Welding Compounds: 490 g/L.
24. PVC Welding Compounds: 510 g/L.
25. Adhesive Primer for Plastic: 650 g/L.
26. Sheet Applied Rubber Lining Adhesive: 850 g/L.
27. Aerosol Adhesive, General Purpose Mist Spray: 65 percent by weight.
28. Aerosol Adhesive, General Purpose Web Spray: 55 percent by weight.
29. Special Purpose Aerosol Adhesive (All Types): 70 percent by weight.
30. Other Adhesives: 250 g/L.
31. Architectural Sealants: 250 g/L.
32. Non-membrane Roof Sealants: 300 g/L.
33. Single-Ply Roof Membrane Sealants: 450 g/L.
34. Other Sealants: 420 g/L.
35. Sealant Primers for Nonporous Substrates: 250 g/L.
36. Sealant Primers for Porous Substrates: 775 g/L.
37. Modified Bituminous Sealant Primers: 500 g/L.
38. Other Sealant Primers: 750 g/L.

B. Credit IEQ 4.2: For field applications that are inside the weatherproofing system, paints and coatings shall comply with the following VOC content limits when calculated according to 40 CFR 59 (EPA method 24):

1. Flat Paints and Coatings: VOC not more than 50 g/L.
2. Nonflat Paints and Coatings: VOC not more than 150 g/L.
3. Dry-Fog Coatings: VOC not more than 400 g/L.
4. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
7. Pretreatment Wash Primers: VOC not more than 420 g/L.
8. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
9. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
10. Floor Coatings: VOC not more than 100 g/L.
11. Shellacs, Clear: VOC not more than 730 g/L.
12. Shellacs, Pigmented: VOC not more than 550 g/L.
13. Stains: VOC not more than 250 g/L.

C. Credit IEQc4.3: All flooring must comply with the following as applicable to the project scope:

1. All carpet and carpet cushion must meet the requirements of the Carpet and Rug Institute Green Label Program.
2. All carpet adhesive must have VOC limit of 50 g/L.
3. All hard surface flooring must meet the requirements of the FloorScore Standard.
4. Concrete, wood, bamboo and cork floor finishes and tile setting adhesives must meet the requirements of South Coast Air Quality Management District (SCAQMD) Rules 1113 and 1168.

D. Credit IEQc4.4: Do not use composite wood, agrifiber products or adhesives that contain urea- formaldehyde resin. FF & E are not included. Products include:

1. Panel substrates
2. Door cores
3. Strawboard
4. Wheatboard
5. Plywood
6. Medium density fiberboard (MDF)
7. Particleboard

PART 3 – EXECUTION

3.1 CONSTRUCTION ACTIVITIES POLLUTION PREVENTION

A. SS Prerequisite 1 Construction Activities Pollution Prevention:
   1. Follow LEED instructions in LEED NCv3.0 Reference Guide and complying with Section 31 25 13 - Erosion Controls.
   2. Contractor is responsible for completing the LEED online credit template and attaching the following information to the template:
      a. Provide record of compliance with Erosion and Sediment Control Plan:
         i. Monthly photographs of barriers and containment.
         ii. Monthly photographs of dust control measures
         iii. Records of inspections by agency in charge of overseeing compliance.
   3. The LEED Project Administrator will determine if the information prepared by the Contractor is satisfactory for USGBC submission.

3.2 CONSTRUCTION WASTE MANAGEMENT

A. Credit MRc2: Comply with Section 01 74 19 - Construction Waste Management and Disposal.
   1. Contractor is responsible for completing the LEED online credit template. Attached documentation in support of the credit shall include:
      a. Monthly photographs of waste recycling sorting area including:
         i. Debris control fencing.
         ii. Signage clearly identifying the containers content.
      b. Spreadsheet containing the following information:
         i. Diverted materials description.
         ii. Diverted materials/waste hauler name.
         iii. Date of each haul.
         iv. Quantity of material in each haul.
      c. Copies of recycling vender and waste hauler tipping receipts.
   2. The LEED Project Administrator will determine if the information prepared by the Contractor is satisfactory for USGBC submission.

3.3 RECYCLED CONTENT OF BUILDING MATERIALS

A. Credit MRc4: Recycled Content:
   1. Follow LEED instructions in LEED NCv3.0 Reference Guide.
   2. Provide record showing the preconsumer and post-consumer recycled content of all materials specified in Divisions 2 - 32.
   3. Contractor is responsible for completing the LEED online credit template and attaching the following information to the template:
      a. Spreadsheet containing the following information:
         i. The description of each materials in each product specified in Divisions 2 - 32.
         ii. Material manufacturer's name.
         iii. Material cost.
         iv. Percent preconsumer recycled content of each material.
         v. Percent post-consumer recycled content of each material.
         vi. Recycled content information source.
      b. Copies of vendors literatures or a statement from vendors on vendor's letterhead confirming the figures used in the spreadsheet.
   4. The LEED Project Administrator will determine if the information prepared by the Contractor is satisfactory for USGBC submission.

3.4 REGIONAL MATERIALS

A. Credit MRc5: Regional Materials:
   1. Follow LEED instructions in LEED NCv3.0 Reference Guide.
   2. Provide record showing the manufacturing location for all materials specified in Divisions 2 - 32.
   3. Contractor is responsible for completing the LEED online credit application and attaching the following information to the application:
      a. Copies of vendors literatures or a statement from vendors on vendor's letterhead confirming the figures used in the spreadsheet.
   4. The LEED Project Administrator will determine if the information prepared by the Contractor is satisfactory for USGBC submission.

3.5 RAPIDLY RENEWABLE MATERIALS

A. Credit MRc6: Rapidly Renewable Materials:
   1. Follow LEED instructions in LEED NCv3.0 Reference Guide.
   2. Provide record showing the cost for all rapidly renewable materials specified in Divisions 2 - 32.
   3. Contractor is responsible for completing the LEED online credit application and attaching the following information to the application:
      a. Spreadsheet containing the following information:
         i. The description of each materials in each product specified in Divisions 2 - 32.
         ii. Material manufacturer's name.
         iii. Material cost.
         iv. Percent rapidly renewable.
      b. Copies of vendors literatures or a statement from vendors on vendor's letterhead confirming the figures used in the spreadsheet.
   4. The LEED Project Administrator will determine if the information prepared by the Contractor is satisfactory for USGBC submission.

3.6 CERTIFIED WOOD

A. Credit MRc7 Certified Wood:
   1. Follow LEED instructions in LEED NCv3.0 Reference Guide to comply with Credit MRc7 requirements for certified wood installed in construction.
   2. Contractor is responsible for completing the LEED online credit template and attaching the following information to the template:
      a. Copies of vendors literatures or a statement from vendors on vendor's letterhead confirming the figures used in the LEED Online Certified Wood Materials Calculator spreadsheet.
      b. Copies of the chain-of-custody documentation received from vendors on vendors.
   3. The LEED Project Administrator will determine if the information prepared by the Contractor is satisfactory for USGBC submission.

3.7 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

A. Credit IEQc3.1: Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."
   1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 1 Section "Temporary Facilities and Controls", install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
   2. Replace all air filters immediately prior to occupancy.
   3. Provide record of compliance with Indoor Air Quality Management Plan:
      a. Monthly photographs of equipment and ductwork protection.
      b. Monthly photographs of filters used to protect air distribution and equipment.
      c. Contractor's report documenting that MERV 8 filters were used to protect equipment during construction and MERV 13 filters were installed prior to occupancy.

B. Credit IEQc3.2: Indoor Air Quality management Plan – Before Occupancy:
   1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent.
   2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or the design minimum outside air rate determined in IEQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three (3) hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. of outside air has been delivered to the space.
   3. Air-Quality Testing: If the Contractor chooses to test for compliance with LEED Credit IEQc3.2 the following is required:
      a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air

Pollutants in Indoor Air," and as additionally detailed in the USGBC's "Green Building Design and Construction Reference Guide".

b. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
   i. Formaldehyde: 27 ppb.
   ii. Particulates (PM10): 50 micrograms/cu. m.
   iii. Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
   iv. 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
   v. Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.

c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, samples are to be taken from the same locations as the first test.

d. Air-sample testing shall be conducted as follows:
   i. All measurements shall be conducted prior to occupancy but during normal occupied hours and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
   ii. Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required to be in place for the testing.
   iii. Number of sampling locations will vary depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.
   iv. Air samples shall be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum four- hour period.

4. The LEED Project Administrator will determine if the information prepared by the Contractor is satisfactory for USGBC submission.

3.8 LOW EMITTING MATERIALS

A. Credit IEQc4.1 through Credit MRc4.4: Low Emitting Materials:
   1. Follow LEED instructions in LEED NCv3.0 Reference Guide.
   2. Contractor is responsible for completing the LEED online credit template and attaching the following information to the template:
      a. Copies of vendor's literature or MSDS sheets confirming the figures used in the spreadsheet.
   3. The LEED Project Administrator will determine if the information prepared by the Contractor is satisfactory for USGBC submission.

3.9 INDOOR CHAMICAL AND POLLUTANT SOURCE CONTROL

A. Credit IEQc5: Indoor Chemical and Pollutant Source Control:
   1. Install new air filtration media, with a MERV 13 Rating, in regularly occupied areas prior to occupancy.

3.10 SUPPLEMENT

A. The supplement listed below, following "End of Section," is a part of this Specification:
   1. LEED for New Construction v3.0 Registered Project Checklist.

1

LEED v3 for New Construction and Major Renovations
Project Checklist

16	**1**	**0**	**9**		**Sustainable Sites**		Possible	**26**
Y	?Y	?N	N	d/C				
Y				C	Prereq 1	Construction Activity Pollution Prevention		
1				d	Credit 1	Site Selection		1
5				d	Credit 2	Development Density and Community Connectivity		5
1				d	Credit 3	Brownfield Redevelopment		1
6				d	Credit 4.1	Alternative Transportation—Public Transportation Access		6
			1	d	Credit 4.2	Alt Transportation—Bike Storage and Changing Rooms		1
3				d	Credit 4.3	Alternative Transportation—L.E. and Efficient Vehicles		3
			2	d	Credit 4.4	Alternative Transportation—Parking Capacity		2
			1	C	Credit 5.1	Site Development—Protect or Restore Habitat		1
			1	d	Credit 5.2	Site Development—Maximize Open Space		1
			1	d	Credit 6.1	Stormwater Design—Quantity Control		1
			1	d	Credit 6.2	Stormwater Design—Quality Control		1
			1	C	Credit 7.1	Heat Island Effect—Non-roof		1
	1			d	Credit 7.2	Heat Island Effect—Roof		1
			1	d	Credit 8	Light Pollution Reduction		1
10	**0**	**0**	**0**		**Water Efficiency**		Possible Points:	**10**
Y	?Y	?N	N	d/C				
Y				d	Prereq 1	Water Use Reduction—20% Reduction		
				d	Credit 1	Water Efficient Landscaping		2 to 4
						Reduce by 50%		2
4						No Potable Water Use for Irrigation		4
2				d	Credit 2	Innovative Wastewater Technologies		2
				d	Credit 3	Water Use Reduction		2 to 4
						Reduce by 30%		2
						Reduce by 35%		3
4						Reduce by 40%		4
15	**2**	0	**18**		**Energy and Atmosphere**		Possible Points:	**35**
Y	?Y	?N	N	d/C				
Y				C	Prereq 1	Fundamental Commissioning of Building Energy Systems		
Y				d	Prereq 2	Minimum Energy Performance		
Y				d	Prereq 3	Fundamental Refrigerant Management		
6	**1**		**12**	d	Credit 1	Optimize Energy Performance		1 to 19
						Improve by 12% for New Buildings		1

							Improve by 14% for New Buildings	2
							Improve by 16% for New Buildings	3
							Improve by 18% for New Buildings	4
							Improve by 20% for New Buildings	5
							Improve by 22% for New Buildings	6
							Improve by 24% for New Buildings	7
							Improve by 26% for New Buildings	8
							Improve by 28% for New Buildings	9
							Improve by 30% for New Buildings	10
							Improve by 32% for New Buildings	11
							Improve by 34% for New Buildings	12
							Improve by 36% for New Buildings	13
							Improve by 38% for New Buildings	14
							Improve by 40% for New Buildings	15
							Improve by 42% for New Buildings	16
							Improve by 44% for New Buildings	17
							Improve by 46% for New Buildings	18
							Improve by 48%+ for New Buildings	19
2	**1**		**4**	d	Credit 2	On-Site Renewable Energy		1 to 7
							1% Renewable Energy	1
							3% Renewable Energy	2
							5% Renewable Energy	3
							7% Renewable Energy	4
							9% Renewable Energy	5
							11% Renewable Energy	6
							13% Renewable Energy	7
2				C	Credit 3	Enhanced Commissioning		2
2				d	Credit 4	Enhanced Refrigerant Management		2
3				C	Credit 5	Measurement and Verification		3
			2	C	Credit 6	Green Power		2
8	**2**	**0**	**4**	d/C	**Materials and Resources**		Possible Points:	**14**
Y	?Y	?N	N					
Y				d	Prereq 1	Storage and Collection of Recyclables		
3				C	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof		1 to 3
							Reuse 55%	1
							Reuse 75%	2
							Reuse 95%	3
			1	C	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural		1
2				C	Credit 2	Construction Waste Management		1 to 2
							50% Recycled or Salvaged	1

						2	75% Recycled or Salvaged	2
			2	C	Credit 3	Materials Reuse		1 to 2
						1	Reuse 5%	1
						1	Reuse 10%	2
1	**1**			C	Credit 4	Recycled Content		1 to 2
						1	10% of Content	1
						1	20% of Content	2
1	**1**			C	Credit 5	Regional Materials		1 to 2
						1	10% of Materials	1
						1	20% of Materials	2
			1	C	Credit 6	Rapidly Renewable Materials		1
1				C	Credit 7	Certified Wood		1
9	**1**	**0**	**5**		**Indoor Environmental Quality**		Possible Points:	**15**
Y	?Y	?N	N	d/C				
Y				d	Prereq 1	Minimum Indoor Air Quality Performance		
Y				d	Prereq 2	Environmental Tobacco Smoke (ETS) Control		
1				d	Credit 1	Outdoor Air Delivery Monitoring		1
			1	d	Credit 2	Increased Ventilation		1
1				C	Credit 3.1	Construction IAQ Management Plan—During Construction		1
1				C	Credit 3.2	Construction IAQ Management Plan—Before Occupancy		1
1				C	Credit 4.1	Low-Emitting Materials—Adhesives and Sealants		1
1				C	Credit 4.2	Low-Emitting Materials—Paints and Coatings		1
1				C	Credit 4.3	Low-Emitting Materials—Flooring Systems		1
1				C	Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber		1
1				d	Credit 5	Indoor Chemical and Pollutant Source Control		1
1				d	Credit 6.1	Controllability of Systems—Lighting		1
			1	d	Credit 6.2	Controllability of Systems—Thermal Comfort		1
			1	d	Credit 7.1	Thermal Comfort—Design		1
			1	d	Credit 7.2	Thermal Comfort—Verification		1
			1	d	Credit 8.1	Daylight and Views—Daylight		1
	1			d	Credit 8.2	Daylight and Views—Views		1
3	**0**	**0**	**3**		**Innovation and Design Process**		Possible Points:	**6**
Y	?Y	?N	N					
1				d	Credit 1.1	Innovation in Design: WEc2: Treat 100% onsite		1
			1	C	Credit 1.2	Innovation in Design: MRc4: 30% Recycled Content		1
			1	C	Credit 1.3	Innovation in Design: MRc5: 30% Regional Materials		1
			1	d	Credit 1.4	Innovation in Design: Building Education Program		1
1				d	Credit 1.5	Innovation in Design: Green Cleaning		1
1				d	Credit 2	LEED Accredited Professional		1

2	**0**	**0**	**4**		**Regional Priority Credits**	Possible Points:	**6**
Y	?Y	?N	N	d/C			
1				d	Credit 1.1	Regional Priority: Based on Achieving SSc1	1
			1	d	Credit 1.2	Regional Priority: Based on Achieving SSc5.1	1
			1	d	Credit 1.3	Regional Priority: Based on Achieving SSc5.2	1
			1	d	Credit 1.4	Regional Priority: Based on Achieving SSc4.2	1
1				d	Credit 1.5	Regional Priority: Based on Achieving WEc1	1
			1	d	Credit 1.6	Regional Priority: Based on Achieving SSc6.1	1
63	6		43		**Total**	Possible Points:	**112**
Y	?Y	?N	N				

END OF SECTION

SECTION 01 91 00
COMMISSIONING

PART 1 – GENERAL

1.1. SUMMARY

A. Purpose: Define the responsibilities of the parties involved and the procedures related to the commissioning process

1.2. RELATED SPECIFICATIONS

A.	Section 01 31 13	Project Management and Coordination
B.	Section 01 31 19	Project Meetings
C.	Section 01 31 23	Project Management
D.	Section 01 32 26	Construction Progress Reporting
E.	Section 01 33 23	Submittals
F.	Section 01 45 16	Field Quality Control
G.	Section 01 77 00	Closeout Procedures
H.	Section 01 78 23	Operation and Maintenance Data
I.	Section 01 78 39	As-Built Drawings
J.	Section 01 79 00	Demonstration and Training
K.	Section 01 81 13	Sustainable Design Requirements
L.	Section 01 95 00	Measurement & Verification
M.	Section 23 05 93	Testing, Adjusting, and Balancing for HVAC
N.	Section 23 09 00	Instrumentation and Control for HVAC

1.3 REFERENCES

A. ASHRAE Guideline 1.1-2007, “HVAC&R Technical Requirements for The Commissioning Process”.
B. ASHRAE Guideline 0-2005, “The Commissioning Process”.
C. NEBB – Procedural Standards for Building Systems Commissioning.

1.4 DEFINITIONS

A. Acceptance Phase. Phase of construction after startup and initial checkout when functional performance tests are performed.
B. Commissioning Authority (CxA). An independent entity, not otherwise associated with the A/E team members or the Contractor and reports directly to the Owner. The CxA directs and coordinates the commissioning activities.
C. Commissioning Plan (Cx Plan). An overall plan, developed before or after bidding, that provides the structure, schedule and coordination planning for the commissioning process. The Cx Plan is included in the bid documents and is to be reviewed by all contractors before submitting their bid.

D. Contract Documents. The documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, Cx Plan, etc.).
E. Construction Checklist (CC). a list of items to inspect and test equipment and components to verify proper installation of equipment. The CCs are provided by the CxA to the Sub.
F. Datalogging. - Monitoring flows, currents, status, pressures, etc. of equipment using stand-alone dataloggers separate from the control system.
G. Deferred System Performance Tests. SPT's that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that prevent the tests from being performed earlier.
H. Deficiency. A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the Owner's Project Requirements).
I. Factory Testing. Testing of equipment on-site or at the factory by factory personnel with an Owner's representative present.
J. Indirect Indicators. Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.
K. Manual Test. Using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
L. Monitoring. Recording parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of control systems.
M. Over-written Value. Writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 75F to 50F to verify economizer operation). See also "Simulated Signal."
N. Owner's Project Requirements (OPR). A document that describes what the Owner and stakeholders want to achieve with this project and what expectations they have of the completed project.
O. Sampling. Reviewing or testing only a fraction of the total number of identical or near identical pieces of equipment.
P. Seasonal Performance Tests. SPT's that are deferred until the system(s) will experience conditions closer to their design conditions.
Q. Simulated Condition. Condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).
R. Simulated Signal. Disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.
S. System Performance Test (SPT). Dynamic testing of entire systems (rather than just components of the system) under full operation.
T. Trending. Monitoring of control points using the building automation system.

1.5 DESCRIPTION

A. General: Commissioning (Cx) is a systematic process of verifying that all building systems perform interactively to meet the Owner's Project Requirements (OPR). This is achieved by beginning in the planning phase with documenting the OPR and continuing through design, construction, acceptance, and the warranty period with verification of performance. The Cx process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, tesTing and balancing, performance testing and training. Cx during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
    1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
    2. Verify and document proper performance of equipment and systems.
    3. Verify that O&M documentation is complete.
    4. Verify that the Owner's operating personnel are adequately trained.
B. The Cx process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.
C. The commissioning authority (CxA) has no authority to change, modify or direct any work. The CxA can only provide comments and suggestions.
D. Commissioning Plan. The Cx Plan provides guidance in the execution of the Cx process. The CxA will update the Cx Plan regularly as the project progresses. The Drawings and Specifications will take precedence over the Cx Plan.

1.6 RESPONSIBILITIES

A. General Contractor (GC) and Subcontractors (Subs)

1. Construction and Acceptance Phase
   a. Provide assistance to the Construction Manager CM in the coordination of the Cx work by the CxA, and with the CM and CxA ensure that Cx activities are being scheduled into the master schedule.
   b. Provide an updated construction schedule to the CxA any time the schedule changes.
   c. Include the Cx activities in the contract.
   d. Furnish a copy of all submittals and shop drawings pertaining to the commissioned systems for review concurrently with the Architect and Engineers.
   e. Furnish a copy of all construction meeting agendas and minutes to the CxA.
   f. In each purchase order or subcontract written, include requirements for submittal data, O&M data, Cx tasks and training.
   g. GC will ensure that all Subs execute their Cx responsibilities according to the Contract Documents and schedule.
   h. A representative from the GC and each sub associated with the Cx process shall attend the Cx pre- construction meeting and the regular Cx meetings scheduled by the CxA to facilitate the Cx process.
   i. Coordinate and execute the training of Owner personnel.
   j. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
   k. Prepare and submit draft forms, including but not limited to start-up procedures, Testing and Balancing (TAB) forms, calibration forms, etc. for review by the CxA before execution.
   l. Submit test reports to the CxA of all tests performed on components and equipment to be commissioned that are not included as part of the Construction Checklist and SPT procedures.
   m. Complete all construction checklist and functional performance test forms as required by the Cx process.
   n. Support the CxA with verification of the completion of construction checklist and functional performance tests as outlined in PART 3.
   o. Complete and inspect all installations. Certify that all components and systems are operating as intended per Contract Documents.
   p. Remedy all deficiencies immediately as they are identified throughout construction.
   q. Demonstrate functionality of all systems and equipment.
   r. Maintain an updated set of record drawings (on a daily basis) on the construction site.
   s. Provide support and instrumentation to verify TAB reports, start-up reports, calibration reports, and any other report pertinent to the commissioned equipment and systems.
   t. Notify the CxA no less than 21 days before all testing, start-up, and training.
   u. Update the CxA on a weekly basis on the progress of the Cx activities.
   v. Submit trend data in electronic format or allow access to trending data by internet connection as requested by the CxA.
   w. Install access points by every sensor such that the sensor can be calibrated without removal (P/T plugs, plugged holes in ducts etc.).
2. Warranty Period
   a. Execute seasonal or deferred functional performance testing, witnessed by the CxA, according to the specifications.
   b. Correct deficiencies and make necessary adjustments to O&M manuals and record drawings for applicable issues identified in any seasonal testing.

B. Equipment Suppliers

1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
2. Assist in equipment testing per agreements with Subs.
3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the Contractor, except for stand-alone data logging equipment that may be used by the CxA.

4. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
5. Review test procedures for equipment installed by factory representatives.

1.7 SYSTEMS TO BE COMMISSIONED

A. The entire Heating, Ventilation and Air Conditioning (HVAC) system (boilers, chillers, pumps, piping and air distribution systems)
B. Building Automation System (BAS) for the HVAC system
C. Domestic Hot Water
D. Building envelope and roofing system as it pertains to HVAC
E. Lighting and Lighting Controls
F. Solar electric (PV) System
G. Solar hot water (SHW) System
H. Emergency Power System

PART 2 – PRODUCTS

2.1 TEST INFORMATION

A. All instruments needed to verify sensor readings, component performance, and system performance will be provided by GC and Subs and be available to the CxA. These instruments will not be beyond what the contractors need to complete the work specified in these construction documents. Any data logging equipment required in addition to the BAS will be provided by the CxA.
B. All instruments shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Contract Documents. Refer to specification section 23 05 93- Testing, Adjusting, and Balancing for required instrument tolerances.

PART 3 - EXECUTION

3.1 COMMISSIONING TEAM

A. The members of the commissioning team consist of the Commissioning Authority (CxA), the Owner's Project Manager (PM), the designated representative of the Owner's Construction Management team (CM), the General Contractor (GC or Contractor), the architect and design engineers, the Mechanical Contractor, the Electrical Contractor, the TAB Contractor, the Controls Contractor, any other installing subcontractors or suppliers of equipment.
B. Each Cx Team member shall designate one person who is responsible for coordinating the commissioning efforts with the CxA.

3.2 SCHEDULING AND MEETINGS

A. Scheduling. The CxA will work with the other members of the Cx Team according to established protocols to schedule the Cx activities. The CxA will provide sufficient notice to the Cx Team for scheduling Cx activities. The GC will integrate all Cx activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the Cx process.
B. The CxA will provide the initial schedule of primary Cx events at the Cx pre-construction meeting. The Cx Plan provides a format for this schedule. As construction progresses more detailed schedules are developed by the CxA. The Cx Plan also provides a format for detailed schedules.
C. Pre-Construction Meeting. Within 60 days of selection of the GC, the CxA will schedule, plan, and conduct a Cx pre-construction meeting with the entire Cx team in attendance. Meeting minutes will be distributed to all parties by the CxA. Information gathered from this meeting will allow the CxA to revise the Cx Plan which will also be distributed to all parties.
D. Meetings. The Cx meetings will be scheduled approximately once a month during construction. These meetings will be scheduled directly before or after the regular construction meetings if practical. These meetings will cover coordination, deficiency resolution and planning issues with particular Subs. The CxA will plan these meetings and will minimize unnecessary time being spent by Subs

3.3 REPORTING

A. The CxA will provide regular reports to the Owner as construction and Cx progresses. Standard forms are provided and referenced in the Cx Plan.

B. The CxA will regularly communicate with all members of the Cx team, keeping them apprised of Cx progress and scheduling changes through memos, progress reports, etc.

C. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.

3.4 RECORD DRAWINGS

A. The CxA will verify that the record drawings are updated throughout the construction. If a discrepancy is found between the record drawings and the installations, the CxA will notify the GC immediately. It is the GC and subcontractors responsibility to then inspect the installations and immediately and completely update the record drawings such that they accurately reflect the installation.

3.5 CONSTRUCTION COMMISSIONING PROCEDURES

A. The following procedures apply to all equipment to be commissioned.

B. General. Construction checklists are important to ensure that the equipment and systems are hooked up and operational. It ensures that system performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full checkout. No sampling strategies are used. All construction checklists for a given system must be successfully completed prior to formal system performance testing of equipment or subsystems of the given system.

C. Construction Checklists.

1. The primary purpose of the construction checklists is to provide the individual workers with the key criteria for a successful installation. The secondary purpose is to track the progress of the delivery and installation.
2. The CxA will develop construction checklists for all commissioned equipment and distribute these to the responsible contractor. The GC and Subs will review the construction checklists for each equipment type and provide comments to the CxA. The CxA will then print and distribute the construction checklist for each individual component.
3. The GC and Subs are responsible for all requirements in the specification, not only the requirements listed on the checklists.
4. The checklists answer format will be to circle yes /no or provide a brief answer such as providing the model or serial numbers.
5. These checklists are provided by the CxA to the GC. The GC determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form may have more than one trade responsible for its execution.
6. The construction checklists shall be completed as delivery is completed and the installation progresses.
7. Only individuals who have direct knowledge and witnessed that a line item task on the construction checklist was actually performed shall initial or check that item off. It is not acceptable for supervisors without direct knowledge or who have not witnessed the line item task on the construction checklist to fill out these forms.
8. Any negative response shall immediately be brought to the attention of the CxA. All negative replies shall be explained in detail on the construction checklist.
9. The GC and Subs are responsible for recording the completion of the checklists. Checklists shall be submitted electronically to SharePoint in .pdf format in separate files by Division. Each file shall be bookmarked by checklist tag.
10. Non-itemized installations such as wiring, ductwork, piping etc. will not have checklists to be completed, but the GC and Subs will be provided the key criteria for successful installation.
11. The CxA will verify the construction checklist completion by a sampling of the delivered and installed equipment. The sampling process will be described in the Cx Plan.

D. Sensor Calibration. Calibration of all sensors shall be included as part of the construction checklists performed by the Contractors. Calibration information is provided in specification Section 23 09 23 - Direct Digital Control System for HVAC

E. Deficiencies, Non-Conformance and Approval in Checklists and Startup.

1. The Subs shall clearly list any outstanding items of the construction checklist that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of task completion.
2. The CxA reviews the report and submits either a non-compliance report or an approval form to the Sub or CM. The CxA shall work with the Subs and vendors to correct deficiencies or

uncompleted items. The CxA will involve the CM and others as necessary. The installing Subs or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CxA as soon as outstanding items have been corrected and include a Statement of Correction on the original non- compliance report. When satisfactorily completed, the CxA recommends approval of the completion of the checklists to the CM using a standard form.

3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in back charges to the responsible party.

F. System Performance Tests (SPT). SPTs shall be performed to demonstrate that each system is operating according to the documented OPR and Contract Documents. System testing differs to the tests required in the Construction Checklist in that they facilitate bringing all the individual components together to verify that they operate collectively on a system level to provide the required design conditions.

1. Development of Test Procedures. The CxA shall prepare the SPT forms and procedures in accordance with the criteria defined in the Cx Plan. The GC and Subs shall assist the CxA in the preparation of these procedures by answering queries and forwarding site-specific information.
2. Participation: The GC and the Subs are responsible for testing all systems to be commissioned such that they function as described in the contract documents. The CxA will verify the performance of the systems. The CxA will direct, witness and document the SPT verification and GC and Subs will execute the verification tests.

G. Problem Solving. The CxA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the GC, Subs and A/E.

H. Seasonal Testing. During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CxA shall coordinate this activity. Tests will be executed, documented and deficiencies corrected by the appropriate Subs, with facilities staff and the CxA witnessing. Any final adjustments to the O&M manuals and record documents due to the testing will be made.

I. Unforeseen Deferred Tests. If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the PM. These tests will be conducted in the same manner as the seasonal tests.

3.6 SENSOR AND ACTUATOR CALIBRATION

A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gages, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

B. Calibrate using the methods described below; alternate methods may be used, if approved by Owner beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Construction Checklist or other suitable forms, documenting initial, intermediate and final results.

C. All Sensors:

1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
2. Verify that sensors with shielded cable are grounded only at one end.
3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F (0.1 degree C) of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
4. Tolerances for critical applications may be tighter.

D. Sensors without Transmitters - Standard Application:

1. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.
2. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is within the tolerances in the table below of the instrument-measured value.
3. If not, install offset, calibrate or replace sensor.

E. Sensors with Transmitters - Standard Application.

1. Disconnect sensor.
2. Connect a signal generator in place of sensor.
3. Connect ammeter in series between transmitter and building automation system control panel.
4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.
5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.

7. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
8. Reconnect sensor.
9. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.
10. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is within the tolerances in the table below of the instrument-measured value.
11. If not, replace sensor and repeat.
12. For pressure sensors, perform a similar process with a suitable signal generator.

F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
1. Watthour, Voltage, Amperage: 1 percent of design.
2. Pressure, Air, Water, Gas: 3 percent of design.
3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F (0.2 degree C).
4. Relative Humidity: 4 percent of design.
5. Barometric Pressure: 0.1 inch of Hg (340 Pa).
6. Flow Rate, Air: 10 percent of design.
7. Flow Rate, Water: 4 percent of design.
8. Flow Rate, Steam: 3 percent of design.
9. AHU Wet Bulb and Dew Point: 2.0 degrees F (1.1 degrees C).
10. Hot Water Coil and Boiler Water Temperature: 1.5 degrees F (0.8 degrees C).
11. Cooling Coil, Chilled and Condenser Water Temperatures: 0.4 degrees F (0.2 degree C).
12. Combustion Flue Temperature: 5.0 degrees F (2.8 degrees C).
13. Oxygen and CO2 Monitors: 0.1 percentage points.
14. CO Monitor: 0.01 percentage points.
15. Natural Gas and Oil Flow Rate: 1 percent of design.

G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

H. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
2. Set pump/fan to normal operating mode.
3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
4. Command valve/damper to open; verify position is full open and adjust output signal as required.
5. Command valve/damper to a few intermediate positions.
6. If actual valve/damper position does not reasonably correspond, replace actuator

I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.
1. With full pressure in the system, command valve closed.
2. Use an ultra-sonic flow meter to detect flow or leakage.

3.7 NON-CONFORMANCE

A. All deficiencies or non-conformance issues shall be noted and reported by the GC to the CM on a standard non-compliance form.

B. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.

C. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the CM and the Owner.

D. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.
1. When there is no dispute on the deficiency and the Sub accepts responsibility to correct it:
a. The CxA documents the deficiency and the Sub's response and intentions and they go on to another test or sequence. After the day's work, the CxA submits the non-compliance reports to the CM for signature, if required. A copy is provided to the Sub and CxA. The Sub corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested and sends it back to the CxA.
b. The CxA reschedules the test and the test is repeated.
2. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:

a. The deficiency shall be documented on the non-compliance form with the Sub's response and a copy given to the CM and to the Sub representative assumed to be responsible.
b. Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the Project Manager.
c. The CxA documents the resolution process.
d. Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA. The CxA reschedules the test and the test is repeated until satisfactory performance is achieved.

3. Cost of Retesting.
a. The cost incurred by the Subs to retest a construction checklist item or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the GC.
b. For a deficiency identified, not related to any construction checklist or start-up fault, the following shall apply: The CxA and CM will direct the retesting of the equipment once at no "charge" to the GC for their time. However, the CxA's and CM's time for a second retest will be charged to the GC, who may choose to recover costs from the responsible Sub.
c. The time for the CxA and CM to direct any retesting required because a specific construction checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be backcharged to the GC, who may choose to recover costs from the party responsible for executing the faulty installation or test.
d. The Contractor shall respond in writing to the CxA and CM at least as often as Cx meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during Cx. Discussion shall cover explanations of any disagreements and proposals for their resolution.
e. The CxA retains the original non-conformance forms until the end of the project.
f. Failure Due to Manufacturer Defect. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the CM or PM. In such case, the Contractor shall provide the Owner with the following:
g. Within one week of notification from the CM or PM, the Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the CM or PM within two weeks of the original notice.
h. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation. The CM or PM will determine whether a replacement of all identical units or a repair is acceptable.
i. Two examples of the proposed solution will be installed by the Contractor and the CM will be allowed to test the installations for up to one week, upon which the CM or PM will decide whether to accept the solution.
j. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

E. Approval. The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA and by the CM, if necessary. The CxA recommends acceptance of each test to the CM using a standard form. The CM gives final approval on each test using the same form, providing a signed copy to the CxA and the Contractor.

END OF SECTION

SECTION 01 95 00
MEASUREMENT AND VERIFICATION

PART 1 – GENERAL

1.1 SUMMARY

A. Purpose: This section includes general requirements that apply to implementation of measurement and verification.

B. RELATED WORK AND REQUIREMENTS

1. Section 01 31 13 Project Coordination
2. Section 01 31 19 Project Meetings
3. Section 01 31 23 Project Management Web Site
4. Section 01 91 00 Commissioning
5. Section 23 09 00 Instrumentation and Control for HVAC
6. Section 23 09 23 Direct Digital Control (DDC) System for HVAC
7. Section 23 09 93 Sequence of Operations for HVAC DDC
8. Section 26 24 13 Switchboards
9. Section 26 24 16 Panelboards

1.2 DEFINITIONS

A. BAS - Building Automation System
B. DHW - Domestic Hot Water
C. M&V - Measurement and Verification
D. kW - Electric power read from utility meter
E. KWh - Electric energy consumption read from utility meter
F. Plug Loads – Electric power and consumption from wall receptacles

1.3 MECHANICAL CONTRACTOR RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform M&V activities including, but not limited to, the following:

1. Follow activities identified in the M&V Plan.
2. Coordinate connection of gas and DHW monitoring equipment with BAS.
3. Cooperate with the M&V Provider and Controls Contractor for resolution of issues related to data collection.
4. Attend team meetings during construction and post-construction M&V period (1 year).

1.4 ELECTRICAL CONTRACTOR RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform M&V activities including, but not limited to, the following:

1. Follow activities identified in the M&V Plan.
2. Coordinate connection of electrical monitoring equipment with BAS

3. Cooperate with the M&V Provider and Controls Contractor for resolution of issues related to data collection.
4. Attend team meetings during construction and post-construction M&V period (1 year).

1.5 CONTROLS CONTRACTOR RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform M&V activities including, but not limited to, the following:
   1. Follow activities identified in the M&V Plan.
   2. Coordinate connection of electrical, gas, and DHW monitoring equipment with BAS
   3. Cooperate with the M&V Provider Mechanical Contractor and Electrical Contractor for resolution of issues related to establishing connection between BAS and monitoring meters and equipment.
   4. Attend team meetings during construction and post-construction M&V period (1 year).

1.6 M&V PROVIDERS RESPONSIBILITIES

A. Providers responsibilities include:
   1. Organize and lead the M&V team.
   2. Provide M&V plan.
   3. Convene M&V meetings as needed.
   4. Cooperate with the Mechanical Contractor, Electrical Contractor, and Controls Contractor for resolution of issues related to establishing connection between BAS and monitoring meters and equipment.
   5. Provide an M&V report at 1 year post construction.

PART 2 – PRODUCTS – THIS SECTION NOT USED

2.1 METERS AND SUB-METERS

A. Monitoring meters and sub-meters, both gas and electric, to have the ability to connect to the BAS and provide data to BAS at a minimum of 15 minute intervals. It is acceptable to use the utility for this purpose if allowable by utility company.

PART 3 - EXECUTION

3.1 METER

A. Provide real-time monitoring of the whole building electricity kW and kWh use by using a signal from the building utility meter serving the HVAC, lighting, and plug loads and provide the data input to the Building Automation System (BAS). The BAS must be capable of trending this kW and kWh data. Data is to be collected in 15 minute intervals. Storage of at least 3 months of 15 minute data is required on the BAS. Data older than 3 months is to be automatically saved and archived on the BAS computer without being overwritten. Data older than 5 years can be overwritten. It is the responsibility of the electrical contractor to coordinate this work.

3.2 SUB-METERS

A. Provide real-time monitoring of the building electricity kW and kWh use by using a signal from the building panel sub-meters at each floor and provide the data input to the BAS. The BAS must be capable of trending this kW and kWh data. Data is to be collected in 15 minute intervals. Storage of at least 3 months of 15 minute data is required on the BAS. Data older than 3 months is to be automatically saved and archived on the BAS computer without being overwritten. Data older than 5 years can be overwritten. It is the responsibility of the electrical contractor to coordinate this work.

3.3 NATURAL GAS

A. Provide real-time monitoring of whole building natural gas consumption by using a signal from the building utility meter to provide the data input to the BAS. The BAS must be capable of trending gas consumption. Data is to be collected in 15 minute intervals. Storage of at least 3 months of 15 minute data is required on the BAS. Data older than 3 months is to be automatically saved and archived on the BAS computer without being overwritten. Data older than 5 years can be overwritten. It is the responsibility of the mechanical contractor to coordinate this work.

3.4 DOMESTIC HOT WATER

A. Provide real-time monitoring of the domestic hot water (DHW) system by measuring water flow to DHW heater and DHW supply and return temperatures and providing data input to the BAS. The BAS must be capable of trending gas consumption. Data is to be collected in 15 minute intervals. Storage of at least 3 months of 15 minute data is required on the BAS. Data older than 3 months is to be automatically saved and archived on the BAS computer without being overwritten. Data older than 5 years can be overwritten. It is the responsibility of the mechanical contractor to coordinate this work.

3.5 TEMPORARY MONITORING

A. Provide easy access to allow for the temporary installation of split-core current sensors and voltage sensors for the electrical measurement and datalogging on the following systems:

1. Lighting
2. Plug loads
3. HVAC equipment including chillers, fans, circulation pumps, and air handling units
4. DHW equipment

3.6 DDC TRENDS

A. The Controls Contractor is to provide provision for remote access to BAS to view status of building and the ability to download trendable points.

END OF SECTION

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