OWL CREEK PHASE 2

CITY OF ANN ARBOR, WASHTENAW COUNTY, MI

SITE PLAN AND REZONING FOR CITY COUNCIL

PROJECT NARRATIVE

Owl Creek – Phase 2
CITY OF ANN ARBOR REQUIRED SITE PLAN INFORMATION
UDC Required Site Plan Information

A. Required Site Plan Information
1. *Cover Sheet – The following general project information should be provided on the cover sheet of the plan set and all subsequent sheets as appropriate.*
a. *Project name, address or location, and type of site plan.* **Owl Creek Phase 2 (Formerly known as The Annex and Woodbury Club Apartments), 3380 Nixon Road, Ann Arbor, MI 48105; Site Plan for Rezoning for City Council Approval.**
b. *Petitioner and agent information, including name, address and contact information.* **Petitioner: BRE Nixon Rd. Associates, 260 E. Brown St. Suite 200, Birmingham, MI 48009 Attn. Adam Bleznak**
Agent: Midwestern Consulting LLC, 3815 Plaza Drive, Ann Arbor, MI 48108; Ph. (734) 995-0200; Attn. Scott W. Betzoldt.
c. *Statement of interest in the land, including conditions for sale or purchases of parcels such as deed restrictions, reservation of land for other uses, or other conditions which may have bearing on the total land Development.*
The petitioner is the property owner.
d. *Vicinity map identifying the location of the Site within the City, including nearest major roads and significant features such as schools, shopping centers and parks.* **See Cover Sheet.**
e. *North indicator (pointing up or to the left) and drawing scale in bar graph form.* **Shown on all relevant sheets.**
f. *Legal description of the Site, including total acreage of the parcel(s) and total acreage of public or private roads contained in the legal description.* **See Existing Conditions and Survey Plan.**
g. *Sheet index and date of plan set.* **See Cover Sheet.**
h. *Required Statements - A brief written statement addressing the following concerns:*
i) Identification of associated applications such as annexation petition, rezoning petition, PUD Zoning District petition, Special Exception Use petition, planned project modification request, landscape modification request, or variance application. Identification of special circumstances associated with the application that require additional procedures or specific approvals such as Natural Features buffer area. **A Site Plan for City Council is being proposed. A variance for a reduction of the rear setback between the proposed structure and the existing City owned property has been granted.**
ii) Proposed development program, including proposed land use, improvements, Floor Area or number of Dwelling Units and bedrooms, access and circulation, off-street parking, preliminary construction phasing and estimated construction costs. **The proposed development is part of a previously approved site plan. The site has frontage on Nixon Road. There are currently three existing 3-story apartment buildings on site. This proposal is to construct one additional building in the north part of the site. .**
Proposed Development Summary:
One new building: a five story apartment building.
Building height: 59 feet
Existing parking spaces to be modified to add 4 new barrier free spaces. The project will result is a loss of 6 parking spaces site wide.
131 new apartment units with 144 bedrooms
Storm water management: the previous site plan provided storm water detention in surface basins under the requirements in place at the time. The current regulations require additional storage volume be provided. This will be provided in underground detention chambers under the building/parking area and will be reviewed by WCWRC.

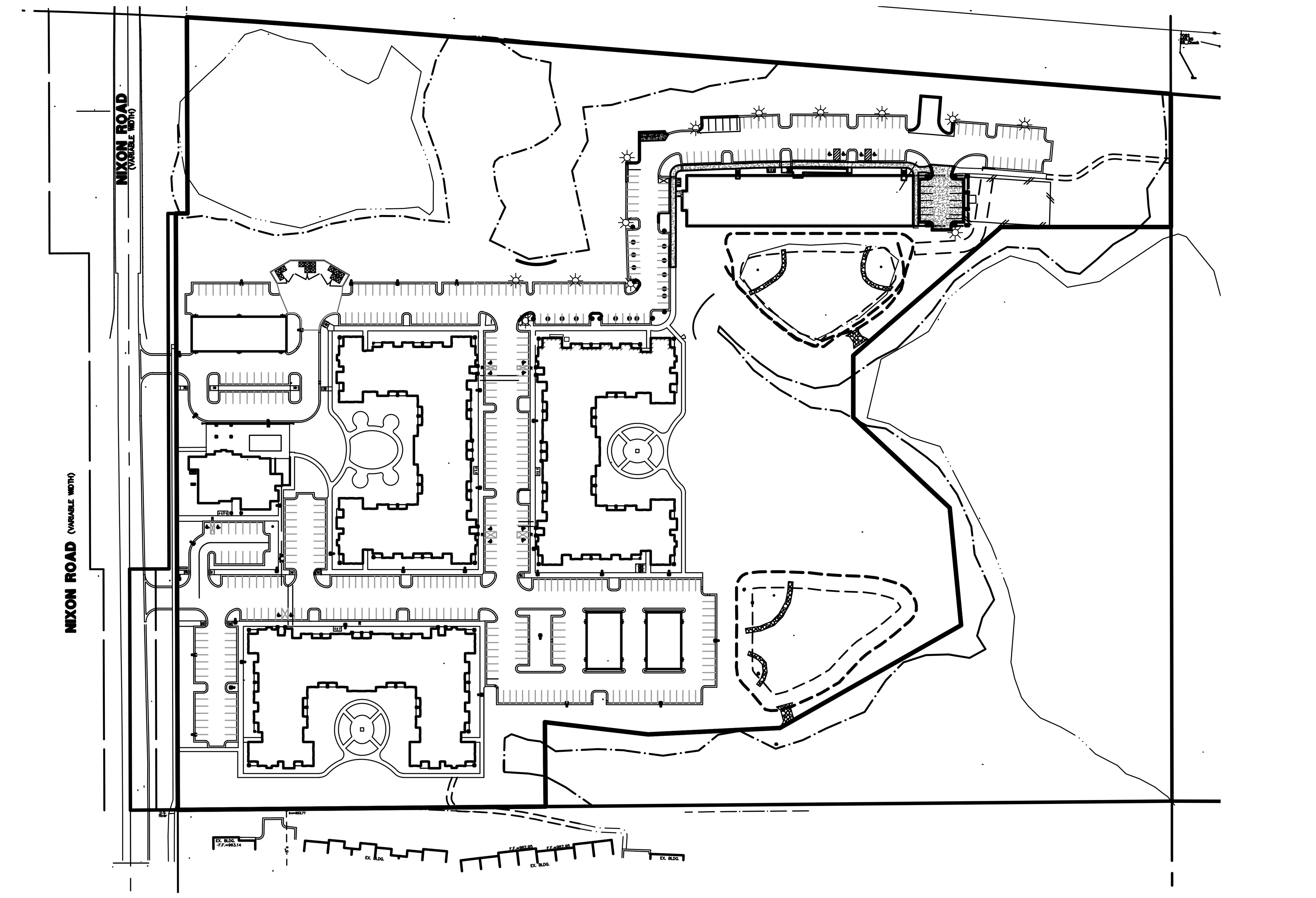
Proposed Phasing and Probable Construction Cost: **The development will be constructed in one phase, beginning on or before 3/1/2024, with completion on or before 11/1/2024. The estimated construction cost is $12,000,000.**
iii) Community Analysis
(a) Impact of proposed Development on public schools. **The units are apartments with studios, 1 and 2 bedroom units. The units are designed market rate apartments. Per 2015 NAHB estimate of an average of 21.9 children per 100 multifamily units. It is anticipated that type of development the number of student will be in the 25 – 30 range and will result in a minimal impact on public elementary and high schools.**
(b) Relationship of intended use to neighboring uses. **The residential units will provide additional housing in this north Ann Arbor neighborhood.**
(c) Impact of adjacent uses on proposed development. **The development will be compatible with the surrounding area of apartment, townhomes and single family residential.**
(d) Impact of proposed Development on the air and water quality, and on existing Natural Features of the Site and neighboring Sites. **There will be no significant impact on air and water quality expected.**
(e) Impact of the proposed use on historic Sites or structures which are located within an historic district or listed on the National Register of Historic Places. **The site is not within a historic district and the existing buildings are not historic structures.**
(f) Natural Features General Descriptions and Impacts: A brief summary of the Natural Features (Woodlands, Wetlands, Water Courses, Landmark Trees, Steep Slopes and Endangered Species Habitat) found on the Site. A detailed report of the quality, character and health of all existing Natural Features, and identification of all proposed impacts to them.
Endangered Species Habitat: **None, Site previously graded.**
100-Year Floodplain: **none on the site.**
Landmark Trees: **No impact**
Steep Slopes: **none.**
Existing Watercourses: **none.**
Wetlands: **No Impact**
Woodlands: **No Impact**
iv) Traffic Statement: The number of vehicle trips per unit per peak hour and supporting documentation from the ITE Manual. **A Traffic Impact Assessment report has been submitted under separate cover.**
v) Public Sidewalk Maintenance Statement **See Cover Sheet, General Notes number 1.**
i. *Comparison Chart of Requirements and Existing and Proposed Conditions*
i) Zoning Classification. **Existing-R4A, Proposed-R4D**
ii) Lot Area. **27.65 acres, 907,373 square feet.**
iii) Total area of all Floors, Floor Area and Floor Area Ratio (FAR), or Density. **399,628 sf (99,985 sf new) including residential, leasing and amenity area.**
iv) Open Space and Active Open Space. **64.9% / 588,895 sf Active open space; 124,100 sf provided (included in total open space area).**
v) Required Setbacks and Yards (front, side and rear). **Front : 10' min, 40' max. : 15.19' provided at clubhouse; North (Side) 30'+ required, 123.23' provided, South (Side) 30'+ required, 49.64' provided, Rear 30'+ required, 35.0' provided**
vi) Height and stories. **Existing buildings are 3 stories, 38.69'; Proposed building is 59', 5 stories.**
vii) Off-street vehicle parking, including accessible and barrier free spaces.
Existing: 548 spaces, including 12 barrier free van & 44 garage spaces
lProposed: 542, including 16 barrier free van & existing 44 garage units
Total Vehicular Parking: 542 spaces provided.
viii) Bicycle parking, including class.
Class A: 50 spaces provided
Class C: 26 spaces provided.
Total Bicycle Parking: 76 spaces provided.
ix) Notation of variances granted or proposed, planned project modifications approved or proposed. **Unknown at this time.**
2. *Existing Conditions Plan– Drawings and written descriptions of the existing conditions of the Site must be included on the plans, including the following:*
a. *ALTA Land Survey***. See Existing Conditions and Survey Plan.**
i) Exception: Where there are no existing public utilities on the Site, the Planning Manager may waive the requirement to provide an ALTA Land Survey for Site Plans for Administrative Approval or when the combination of existing conditions and proposed Development are so minor that preparing an ALTA Land Survey would be a significant financial hardship to the Applicant. In those cases, an existing conditions plan illustrating the boundaries of the Site, location of all structures and improvements, and any easements, prepared by a professional land surveyor must be provided. N/A.
b. *Existing and proposed contours extending 50 feet beyond the Site at a minimum interval of two feet.* **See Existing Conditions and Survey Plan, and Grading Plan.**
c. *If new City public sanitary sewer, water mains, Storm Water Management System, or streets are proposed in conjunction with a site plan, the plans must be referenced to the Ann Arbor Geodetic Reference System.* **The survey is referenced to the AAGRS (State Plane Coordinates, Michigan South Zone (2113).**
3. *Dimensional Layout Plan – Drawings and written descriptions of the proposed Development must be provided on the plans, demonstrating compliance with all applicable Development standards such as building area, height and placement, off-street parking, streets and access, including the following***:** **See Dimensional Site Plan.**
a. *Existing and proposed Lot lines.* **Shown.**
b. *Minimum and maximum Required Setback Lines, including Established Front Building Line and required increases to the normal minimum side and rear setbacks, if applicable; existing and proposed Front, Side and Rear Yards.* **Shown.**
c. *Existing and proposed Buildings.* **See Existing Conditions and Survey Plan for existing buildings. See Dimensional Site Plan for proposed building.**
d. *Vehicle Parking Spaces, aisles and Driveways. Identify any "no parking" areas or fire lanes and indicate any proposed signage.* **See Dimensional Site Plan.**
e. *Bicycle parking, including detail of facilities.* **See Dimensional Site Plan and Architectural Plans, and Miscellaneous Notes and Details sheet.**
f. *Curb Cuts, drive Approaches and curb radii dimensions, including all Curb Cuts on the opposite side of the street from the Site. Dimension of all Fire Department access roads or lanes, if applicable, including width at hydrant, dead end lengths, turn-around location, turning radii, etc.* **See Dimensional Site Plan, Utility Plan and Fire Protection Plan.**
g. *Open Space and Active Open Space.* Minimum 50% required; 64.9% / 588,895 sf provided. Active 124,100 sf
h. *Natural features buffer.* **N/A.**
i. *Conflicting land use buffer.* **N/A.**
j. *Solid waste enclosure, including dimensioned detail.* **See Solid Waste Plans.**
k. *Perspective sketch of building showing Streetwall Height and Offset, if applicable.* **See Architectural Plans.**
4. *Natural Features Plan – Drawings and written descriptions identifying all Natural Features on the Site, proposed protection measures for avoiding disturbance to existing Natural Features, alternatives analysis, and proposed mitigation for any disturbed or removed Natural Features to determine compliance with applicable Development standards must be included on the plan, including the following:* See Natural Features Impact Statement on Existing Conditions and Survey Plan.
a. *Accurate location and description of all Natural Features within the Limits of Soil Disturbance and in an area extending 50 feet beyond the Limits of Soil Disturbance, including:*
i) Limits of Soil Disturbance. **See Grading Plan.**
ii) Boundary and description of any Endangered Species Habitat. **N/A.**
iii) Boundary and elevation of any 100-year floodplain. **N/A.**
iv) Location, species and Critical Root Zone and condition of Landmark Trees. **Located but not impacted.**
v) Location of all Steep Slopes and a cross section through the Site showing the proposed activity in relationship to the topography. ***N/A.***
vi) Existing and proposed Watercourses showing depths, normal water levels, shore gradients, type of bank retention and shore vegetation. **N/A.**
vii) Boundary and character of all Wetlands. **Located but not impacted.**
b. *Boundary and basal area of any Woodland, with location, species and DBH of all trees six inches DBH or greater within the Woodland area.* **Located but not impacted.**
c. *Location and extent of required Natural Features buffer. Identification of any temporary or permanent activity (i.e. impacts or disturbance) within the Natural Features buffer.* **N/A.**
d. *When any activity within the Natural Features buffer is proposed, a written justification responding to each general criteria for determining a proposed activity in the Natural Features buffer is in the public interest.* **N/A.**
e. *Protection measures for those existing Natural Features proposed to be protected as part of the Development, including protections from the construction of the Development.* **Tree protection will be provided for site work in areas of existing trees.**
f. *Identification of all Natural Features proposed to be impacted, disturbed, or removed by the Development, including the construction of the Development.* **Natural Features are identified throughout the site plan but none will be disturbed by this project.**
g. *Alternatives Analysis: When any Natural Features are proposed to be removed or disturbed, drawings and descriptions of at least two alternative plans that were prepared and considered but are not proposed which demonstrate and justify that the proposed Development limits the disturbance or removal of Natural Features on and adjacent to the Site to the minimum necessary to reasonably accomplish the permitted use.* **Not Applicable**

h. *Proposed mitigation measures: When any Natural Features are proposed to be removed or disturbed, proposed mitigation measures must be provided including:* **N/A**
i. *Written description of the mitigation program, identifying the type and appropriate quantity (i.e. basal area, square feet, caliper inches) of Natural Features removed or disturbed and the appropriate quantity of the mitigation proposed.* **N/A**
j. *Replacement calculations.* **N/A**
k. *Location of proposed mitigation plantings.* **N/A**
l. *Chart listing the proposed mitigation plantings, including botanical and common names, caliper sizes, root type and height.* **N/A**
m. *Timing schedule for implementation of mitigation measures.* **N/A.**
n. *Notation and description of any proposed alternative mitigation measures.* **N/A.**
5. *Natural Features Overlay Plan – A drawing including the dimensional layout and the existing Natural Features on Site.* **Natural Features are identified on the site plan but no disturbance is proposed.**
6. *Landscape Plan – Drawings and written descriptions of proposed landscaping, screening and buffers demonstrating compliance with applicable Development standards such as interior landscaping of Vehicular Use Areas, Right-of-Way screening, conflicting land use buffers, and Natural Features mitigation in order to determine compliance with applicable Development standards must be provided on the plans, including the following:*
a. *Location, size and species of existing trees and vegetation, and Natural Features.* **See Existing Conditions and Survey Plan.**
b. *Location of light poles, refuse containers and enclosures, mechanical equipment and hydrants.* **See Dimensional Site Plan, Landscape Plan, and Architectural Plans.**
c. *Limits of Vehicular Use Area and notation of its size in square feet.* **See Landscape Plan.**
d. *Proposed locations of required landscaping, screening and buffers, street trees and plantings.* **See Landscape Plan. No buffer or screening is required. Proposed street trees are shown on the plan.**
e. *Table identifying Vehicular Use Area, interior landscape islands, Right-of-Way screening, conflicting land use buffer, and street tree planting requirements and proposed plantings and areas to satisfy requirements.* **No new net increase in V.U.A. is proposed. Previously provided VUA landscaping is proposed to be re-arrannged.**
f. *Proposed plant list, including caliper sizes, root type, height of material, botanical and common name, type and amount of mulch, ground cover and grasses***. See Landscape Plan.**
g. *Notation of requested modifications if any.* **N/A.**
h. *Planting and staking details in accordance with the standards established by the PSA Administrator.* **See Miscellaneous Notes and Details sheet.**
i. *Specification for treatment of compacted soil on the entire Site.* **See Landscape Plan, Landscape Notes, number 9.**
j. *Specification for planting media in landscape areas.* **See Landscape Plan, Landscape Notes, number 12.**
k. *Irrigation plan or water outlets (hose bibs).* **See Landscape Plan, Landscape Notes, number 1. See also Architectural Plans.**
l. *Landscape maintenance program, including a statement that all diseased, damaged, or dead material shall be replaced in accordance with this Code by the end of the following planting season as a continuing obligation for the duration of the site plan.* **See Landscape Plan, Landscape Notes, number 2.**
m. *Identification of snow storage areas, including a statement that snow shall not be pushed onto interior landscape islands unless designed for snow storage.* **Indicated on sheet 11.**
n. *Berms, retaining walls, screen walls, fences, tree wells to preserve existing trees, culverts to maintain natural drainage patterns, or any other construction details necessary to resolve specific Site conditions.* **See Dimensional Site and Grading Plans.**
7. *Utility Plan – Drawings and written descriptions of the existing and proposed public utilities serving the Site must be provided on the plans, including the following:*
a. *Location and size of existing and proposed public water, sanitary sewer and storm sewer mains and leads.*
Note invert elevations of storm and sanitary mains. **See Existing Conditions and Survey Plan, and Utility Plan.**
b. *Location of existing and proposed fire hydrants. Indicate a 250-foot or 350-foot radius, as appropriate for the type of proposed Development, around each hydrant. Show and dimension hose lay to any external portion of a Structure via an approved fire route from any hydrant or combination of hydrants. Location of fire department connections (FDC) to Buildings. Dimension distance of the hose lay from the FDC to the nearest hydrant via an approved fire route (provide dimension following an actual hose laying route). Location of Knox Box, if applicable. Include a separate Fire Protection and Access Plan sheet if necessary for clarity.* **See Existing Conditions and Survey Plan, Utility Plan, and Fire Protection Plan.**
c. *Location of existing Public Utility easements, including liber and page number.* **N/A.**
d. *Location and dimension of proposed Public Easements. Notation that legal descriptions of proposed easements will be provided with construction drawings and engineering plan submittals as required.* **N/A.**
e. *Sanitary sewer flow mitigation calculations.* **See Utility Plan.**
f. *Location and notation of firewalls within existing or proposed Buildings, or notation that none are existing or proposed.* **There are no firewalls in the proposed building. The building is fully fire suppressed.**
8. *Grading and Soil Erosion Control and Storm Water Management Plan - Drawings and written descriptions demonstrating compliance with the applicable Development standards for Grading and soil Erosion controls must be provided on the plans, including the following:*
a. *Vicinity map showing location of Site and all adjacent properties within 500 feet of the Site boundaries showing relationship to any Watercourse.* See Vicinity Map on the Cover Sheet. **The single water course onsite will not be impacted by the proposed activities.**
b. *Soil investigation report, survey or profile of data regarding the nature, soil type, distribution, erodibility, and supporting ability of existing soils or rock on the Site in accordance with the United States Department of Agriculture soil survey standards.* **Soils Report has been submitted separately. Soil borings have been performed for purposes of infiltration capability.**
c. *Existing and proposed topography at a maximum of two-foot contour intervals, elevations or similar slope descriptions, extending at least 50 feet beyond Site boundary.* **See Existing Conditions and Survey Plan and Grading Plan.**
d. *Location of any existing Structure or Natural Feature on the Site and on land extending at least 50 feet beyond the Site boundary lines.* **See Existing Conditions and Survey Plan and Grading Plan.**
e. *Location of proposed Structures or Development on the Site including physical limits of each proposed Earth Change and all proposed temporary and permanent soil Erosion and Sedimentation Control Measures.* **See Existing Conditions and Survey Plan, Grading Plan and Soil Erosion Control Plan.**
f. *Plans, section and construction –quality details of all soil Erosion and Sedimentation Control Measures, existing and proposed on-site drainage and dewatering facilities, retaining walls, cribbing, planting, anti-Erosion devices or other protective devices to be constructed in connection with, or as part of, the proposed work.* **See Soil Erosion Control Plan details. Dewatering of the site is not anticipated.**
g. *Estimated total cost of the required controls during construction, including dust emission control.* **See Soil Erosion Control Plan, Soil Erosion Control Notes, number 11.**
h. *Estimated total cost of protecting all exposed oil surfaces from Erosion should construction discontinue.* **See Soil Erosion Control Plan, Soil Erosion Control Notes, number 12.**
i. *Estimate of the quantity of excavation and Fill involved.* **See Soil Erosion Control Plan, Soil Erosion Control Notes, number 14.**
j. *Amount of impervious area existing and proposed, and square footage of impervious area reconfigured to accommodate new improvements.* **Existing: 328,007 sf / 27.2%; proposed: 348,090 sf / 28.9%.** *If a Storm Water Management System is required, computations and design of the Storm Water Management System, such as:* **See Storm Water Management Calculations for the proposed detention chamber.**
i) Calculations used to derive the run-off coefficients. **See Basin Storm Water Calculations, W1.**
ii) Map showing the drainage area and land tributary to the Site and estimated runoff of the area served by any drain. **See Stormwater Management Plan.**
*iii) Required storage volume calculations, including first flush, bankfull, and 100-year storm events***. See Basin Storm Water Calculations, W2-W13.**
iv) Calculations for the provided/proposed storage facility. **See Basin Storm Water Calculations, Detention Outlet Calculations.**
v) Required and proposed release rate calculations. **See Basin Storm Water Calculations, Detention Outlet Calculations.**
vi) A plan for the continued maintenance of the permanent Storm Water Management System. **See Soil Erosion Control Plan, Storm Water Management System Permanent Maintenance Plan, Schedule and Cost Estimate.**

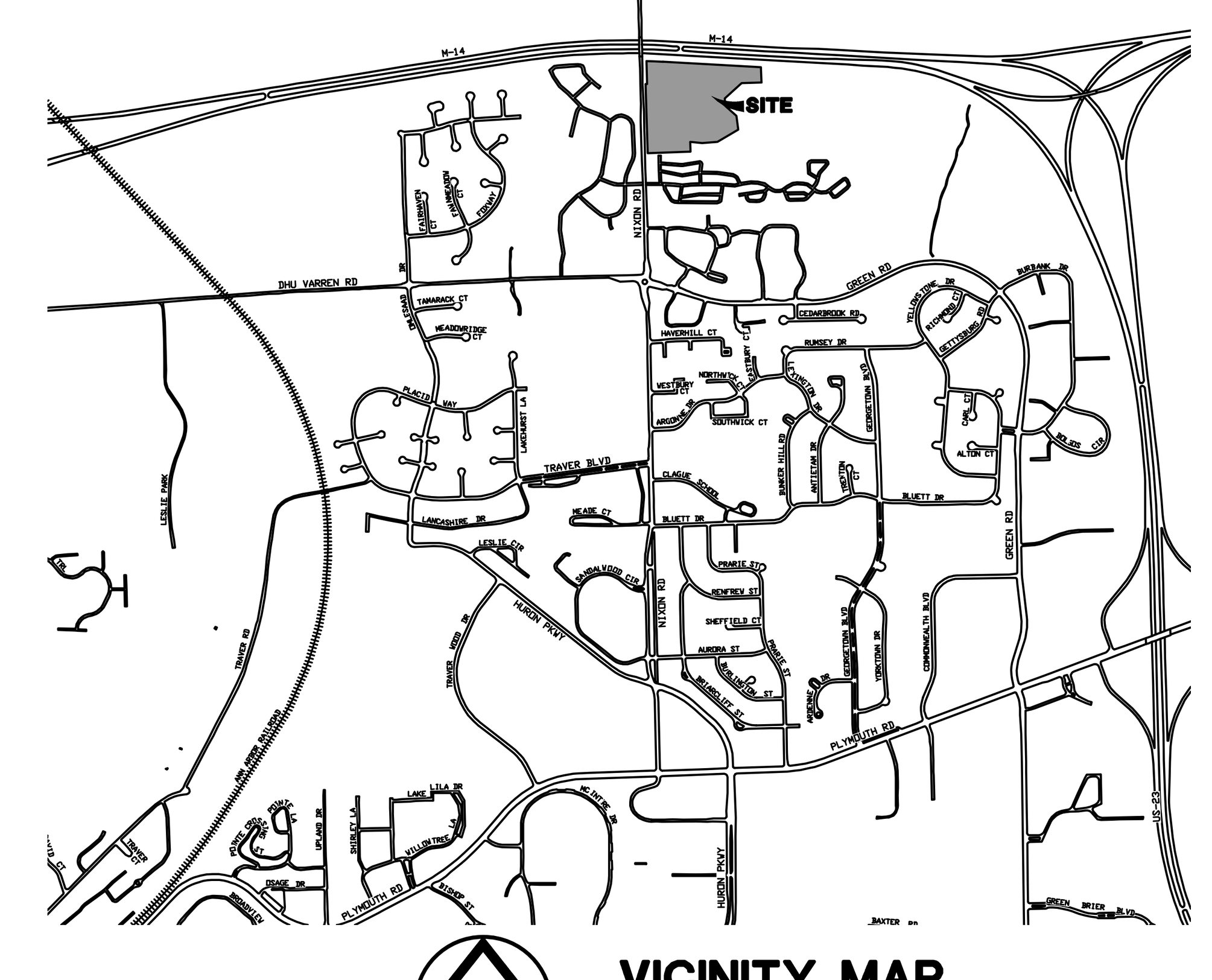
vii) Any other pertinent calculations as determined necessary by the PSA Administrator. **To be provided if required.**
viii) If an alternative method of storm water detention is proposed, a written description of the alternative method of storm water detention and a written explanation as to why the proposed alternative conforms to the Development standards of this Code. **N/A.**
l. *Timing and construction sequence of each proposed Earth Change, including: installation of temporary and permanent soil Erosion and Sedimentation Control Measures, striping and Clearing, rough Grading, installation and Stabilization of Storm Water Management Systems, construction of utilities, roads, infrastructure, and Buildings, final Grading and landscaping, and removal of temporary soil Erosion and Sedimentation Control Measures; identify all proposed phasing consistent with the approved site plan or final preliminary plat.* **See Soil Erosion Control Plan: Construction Sequence. (A Gannt chart has also been provided.**
m. *A program proposal for the continued maintenance of all permanent soil Erosion and Sedimentation Control Measures that remain after Project Completion, including: designation of the person or party responsible for the maintenance; maintenance responsibilities shall become part of any sales or exchange agreement for the land on which the permanent soil Erosion and Sedimentation Control Measures are located.* **See Soil Erosion Control Plan, Maintenance Program for Soil Erosion Controls.**
n. *Other information or data as may be required to demonstrate compliance, such as a soil Erosion control statement including:* **N/A.**
i) *Consideration of alternative actions with evaluation of each.* **N/A.**
ii) *Description of probable adverse environmental effects that cannot be avoided.* **N/A.**
iii) *Identification of any negative impact to Natural Features, including Woody Plants.* **N/A.**
iv) Analysis of primary and secondary consequences of short-term uses of the environment in relation to the maintenance and enhancement of long-term productivity. Remedial, protective and mitigation measures are to be developed for any environmentally detrimental aspect. **N/A.**
v) *If determined necessary by the Code Official, a hydrological study may be required where the Clearing, Grading, or addition of Impervious Surface is proposed within a floodplain not regulated by the MDEQ or unmapped flood prone areas or any lake, pond, Watercourse, or Wetlands. The study shall follow the format used by the MDEQ for hydraulic reports and shall demonstrate that the proposed activity complies with the review standards of this Code.* **N/A.**
9. *Massing and Architectural Plans – Drawings and written descriptions of the massing, architectural design and details, and façade materials of proposed Buildings must be provided on the plans, including:*
a. *Dimensioned floor plans of each building Floor identifying areas excluded from Floor Area and excluded from FAR calculations.* **See Architectural Plans.**
b. *Vertical sections through the Site showing existing and proposed elevations.* **See Architectural Plans.**
c. *Dimensioned architectural design and details with labeled materials.* **See Architectural Plans.**
d. *Perspective renderings of the proposed Development.* **See Architectural Plans.**
10. *Photometric Plan – Drawings and written descriptions of proposed lighting demonstrating compliance with the applicable Development standards, including:* **Provided.**
a. *Location, type and details of proposed lighting fixtures.* **Relocated/replaced streetscape lightpole locations are shown on the Dimensional Site Plan, Utility Plan and Landscape Plan.**
b. *Photometric diagram showing predicted maintained lighting levels of the proposed lighting fixtures.* **Provided**
11. *Traffic Impact Analysis – For proposed Developments that will generate more than three vehicle trips per unit per peak hour or 50 vehicle trips per peak hour, a traffic impact traffic impact analysis must be provided including the following:* **A Traffic Impact Assessment has been submitted under separate cover.**
a. *Existing traffic volumes passing on all streets abutting the proposed Development during the peak hour. Traffic from other new and proposed Developments in the area should be considered.*

b. *Existing peak hour turning movements of vehicular traffic at all public street intersections within 200 feet of the proposed Development, or those intersections that may be impacted by the proposed Development.*
c. *Projected peak our generation rate and peak hours of generation for the proposed Development.*
d. *Projected peak hour traffic movements as a result of the establishment of the proposed facility.*
e. *A capacity analysis for impacted intersections.*
f. *A statement of the total impact the projected generation will have on the existing level of service as determined and certified by a registered engineer.*
g. *A sketch plan showing all existing Driveways to public streets within 200 feet of the proposed Development and all on-street parking or loading areas.*
h. *Proposed Site access Driveways with a determination if a deceleration lane or taper is necessary based on*

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.



SITE MAP
SCALE : 1"=200'



VICINITY MAP
SCALE : NTS

Sheet List Table

NUMBER	SHEET TITLE
1	COVER SHEET
2	EXISTING ALTA SURVEY
3	NATURAL FEATURES AND SITE ANALYSIS PLAN
4	EXISTING CONDITIONS PLAN
5	REMOVAL PLAN
6	OVERALL SITE PLAN
7	DIMENSIONAL SITE PLAN
8	OVERALL UTILITY PLAN
9	UTILITY PLAN
10	PROPOSED GRADING AND SOIL EROSION CONTROL PLAN
11	PREVIOUSLY APPROVED LANDSCAPE PLAN
12	PROPOSED LANDSCAPE PLAN MODIFICATIONS
13	LANDSCAPE NOTES AND DETAILS
14	FIRE PROTECTION PLAN
15	SOLID WASTE PLAN
16	STORM WATER MANAGEMENT PLAN
17	PROP. DETENTION
18	EXISTING BASIN CALCULATIONS FOR OUTLET MODIFICATION
19	MISCELLANEOUS DETAILS
20	EXISTING TREE LISTING
21	ORIGINAL SITE DETENTION CALCULATIONS
22	PHOTOMETRIC PLAN

PROJECT NARRATIVE (cont.)

current City warrant analysis standards, a determination if a left-turn by-pass lane is necessary based on a warrant analysis, and a sight distance study at the Site access Driveway.
i. *A pedestrian circulation plan showing all possible points of conflict between motorized traffic and pedestrian/bicycle traffic on public streets and sidewalks within 200 feet of the proposed Development, or those intersections that may be impacted by the proposed Development.*
j. *A gap study for pedestrian or vehicular traffic may be required at non-signalized locations that may be impacted by the proposed Development. The traffic and/or parking impact analysis shall be reviewed by the Department of Transportation for completeness and accuracy. The analysis shall include a determination of the service volume and capacity of adjacent streets including the traffic from the new development. The methodology to be employed in determining street capacities shall conform to the 1985 edition of the Highway Capacity Manual, Special Report Number 209, or the latest revision thereof. Proposals that will contribute traffic to streets or intersections that are or will be as a result of this proposal at a level of Service D, E, or F as defined in the Highway Capacity Manual may be denied by Commission and Council until such time as necessary street or traffic improvements are scheduled for construction.*

SITE DATA ANALYSIS

I. Site Use

Existing Zoning	R4A
Proposed Zoning	R4D
Site Area	27.65 Acres
Number of Units	395 (including 131 new)
Useable Floor Area	399,628 SF (including 99,985 new)
Space Use Summary	
Building Envelopes	125,170 SF (including 21,083 sf new)
Parking, Drives & Alleys	181,615 SF (including 1,587 sf new)
Useable Open Space	588,895 SF (including reduction of 18,516 sf)

II. Zoning Comparison Information

	PHASE 1		PHASE 2	
	R4A	Existing	R4D	Proposed
Minimum Area per Dwelling Unit	4300 SF	4562 SF	1740	2297
Minimum Useable Open Space	65%	76.4%	50.0%	64.9%
Minimum Active Open Space	84,600 SF	94,300 SF	118,500	124,100
Front Setback (Min./Max.)	15/40 FT	15.00 FT	15 FT	15.00 FT
Rear Setback	30 FT	336 FT	30+	27.7 FT **
Side Setback (South)	20+	49.64 FT	30+	49.64 FT
Side Setback (North)	20+	376.79 FT	30+	123.23 FT
Maximum Building Height	35 FT	38.69 FT*	*75'	59.75 FT
Minimum Lot Size	21,780 SF	907373	83000	907373
Minimum Lot Width	120 FT	1004 FT	200 FT	1004 FT
Density (Gross - Private Streets)	10 D.U. / AC	9.55 D.U./AC	25 D.U./AC	18.97 D.U./AC
Units Allowed	276 D.U.	264 D.U.	691 D.U.	395 D.U.

*R4D will be a conditional rezoning with building height up to 75'
**The applicant is seeking a variance for the rear yeard setback encroachment

III. Parking Provided

		Existing	Provided
Onsite parking spaces		548	540*
Barrier Free spaces		12	16
30% of spaces permitted to be small car parking		106	106
Garage parking provided		44	44
Carport parking spaces provided		271	281
1 bicycle space is required per 5 units		53	79
	CL A	50	74
	CL C	26	38
Phase 2 Parking Area		104	96
EV Parking Req'd-90% Capable, 10% Installed		0	10 Installed, 86 Capable

* There are currently 4 EV spaces onsite. Ten new EV spaces will be added at the new building and the remainder of the spaces around the new building (86) will be EV capable

OWNER/APPLICANT
BRE NIXON RD. ASSOCIATES, LLC
260 E. BROWN STREET
BIRMINGHAM, MICHIGAN 48009
CONTACT: ADAM BLEZNAK
248-540-9300

ENGINEER/SURVEYOR/LANDSCAPE ARCH.
MIDWESTERN CONSULTING, LLC
3815 PLAZA DR.
ANN ARBOR, MI 48108
CONTACT: SCOTT BETZOLDT
734-995-0200

ARCHITECT
J. BRADLEY MOORE & ASSOCIATES ARCHITECTS
4844 JACKSON ROAD, SUITE 150
ANN ARBOR, MICHIGAN 48103
CONTACT: BRAD MOORE
734-930-1500

LEGAL DESCRIPTION
REFER TO SHEET 2 FOR LEGAL DESCRIPTION

SUSTAINABLE ENERGY STATEMENT
BRE Nixon Road Associates, LLC is committed to building a fully electric building. All the furnaces, air conditioners, and kitchen appliances will be powered by electricity. The new building will have a connection to natural gas only insofar as necessary for the use of an emergency electric generator. Additionally, we will implement into the development, a photovoltaic system capable of generating 10,000 kwh annually.

OWL CREEK PHASE 2

JOB No. **23015**		DATE: 5/17/23
REVISIONS:	REV. DATE	SHEET 1 OF 20
PER CITY REVIEW	8/31/23	CADD:
PER CITY REVIEW	11/9/23	ENG: JCA
PER WCWRC REVIEW	12/21/23	PM: SWB
PER CITY REVIEW	3/5/24	TECH:
PER PLANNING COMMISSION COMMENTS	3/25/24	/23015CV1

1

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3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

RELEASED FOR:	DATE

STATE OF MICHIGAN
JAMES C. AHNERT
ENGINEER
No. 43208
LICENSED PROFESSIONAL ENGINEER
P.E. #

M:\Civil3d_Proj_2023\23015\Site Plan\23015CV1.dwg, 3/25/2024 11:12 AM, Jim Ahnert, 1 COVER SHEET, MCLLC PDF.pc3
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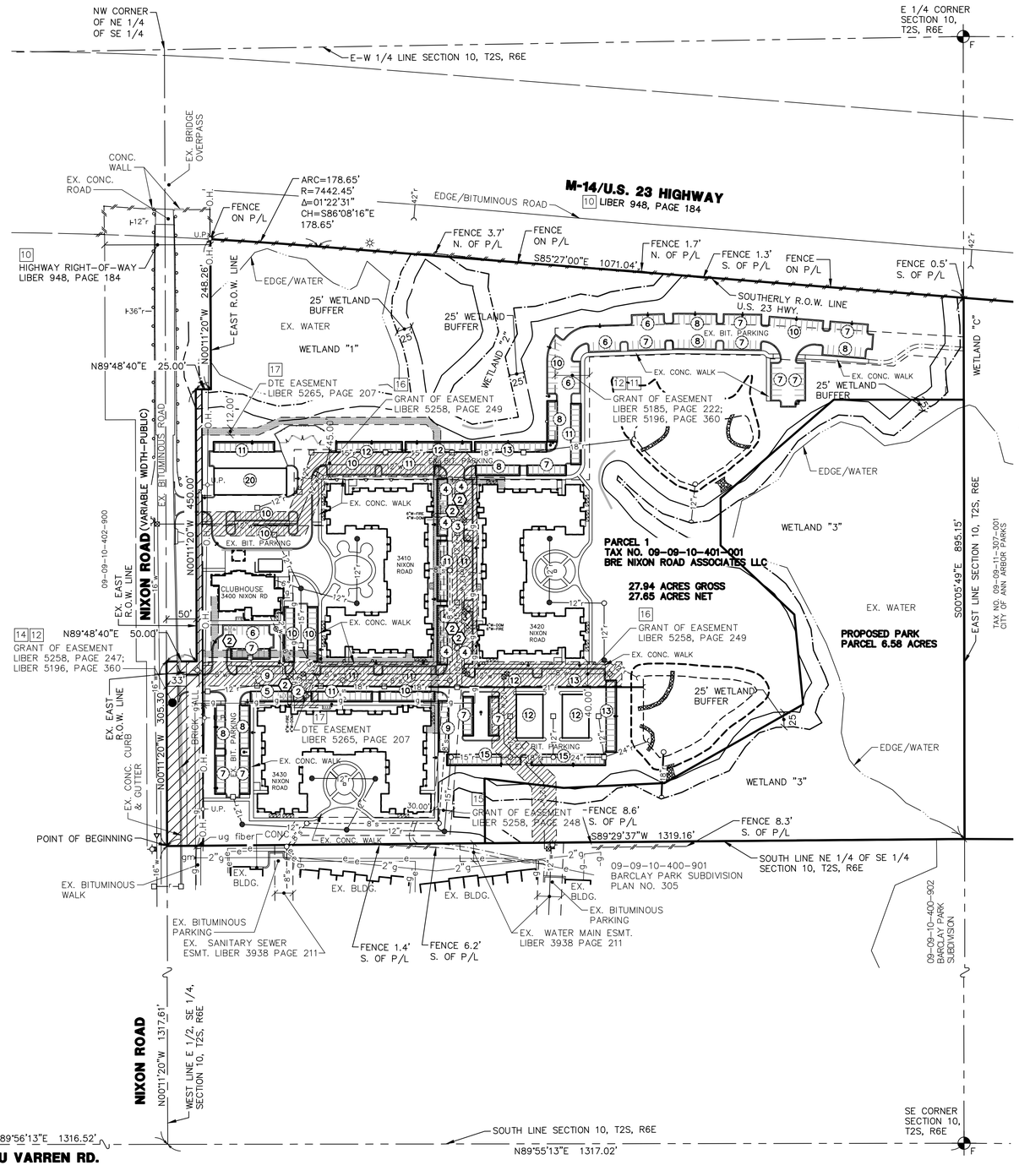


SCALE: 1" = 100'

0 100 200 300

LEGEND

- EXIST. UTILITY POLE
- GUY WIRE
- ELEC. TRANSFORMER
- AC UNIT
- EXIST. OVERHEAD UTILITY LINE
- EXIST. LIGHT POLE
- EXIST. ELECTRIC LINE
- EXIST. GAS LINE
- GAS METER
- TELE PEDESTAL
- EXIST. WATER MAIN
- EXIST. HYDRANT
- EXIST. GATE VALVE IN BOX
- EXIST. GATE VALVE IN WELL
- EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- END SECTION
- CULVERT
- EXIST. SANITARY SEWER
- EXIST. CLEANOUT
- PROPERTY LINE
- EDGE OF WATER
- FENCE
- GUARDRAIL
- FOUND MONUMENT
- SECTION CORNER
- PARKING SPACE #
- BARRIER FREE PARKING SPACE #
- EXCEPTION #
- FLAG POLE

NOTES:

1.) This survey was prepared using First American Title Insurance Company, Title Commitment File No. 856683, dated July 22, 2020.

2.) The parcel herein described is currently zoned R4A - Multiple Family Dwelling District - City of Ann Arbor zoning:

Setbacks: front = 15 feet minimum, 40 feet maximum
rear = 30 feet
side = 20 feet

Height restrictions: 35 ft maximum or 45 ft maximum for buildings with parking below at least 35% of the building.

3.) The parcel herein described is in Zone X (unshaded); the area determined to be outside the 500-year flood hazard, per Federal Emergency Management Agency flood insurance rate map # 26161C0254E, effective date: April 3, 2012.

4.) Parcel address: 3380 Nixon Road, Ann Arbor, Mi 48105.

5.) Parcel has direct access to Nixon Road, a public street.

6.) M-14 Right-of-way fence encroaches onto subject parcel by up to 1.3 feet.

7.) There are no improvements on the Proposed Park Parcel located in the SE corner of the subject parcel.

8.) Site Address: 3380 Nixon Road, Ann Arbor, MI 48105

9.) Building heights measured from ground to mid-point between roof peak and soffit as defined in zoning ordinance

PARKING:

The parcel hereon contains 492 regular parking spaces, an additional 44 regular spaces within garages and 12 handicap spaces. Total parking spaces = 548 spaces.

SURVEY CERTIFICATION

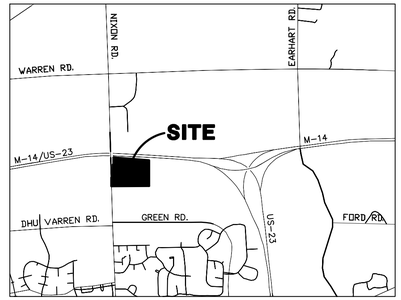
To: The Lafayette Life Insurance Company, and its respective successors and assigns, BRE Nixon Road Associates, LLC, a Michigan limited liability company, and First American Title Insurance Company:

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2016 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes items 2, 3, 4, 6(b), 7(a), 7(b)(1), 7(c), 8, 9, 10(a), 11, 13, 14, 16, 18, 19 and 20 of Table A thereof. The field work was completed on 7/31/2020.

Date: August 26, 2020

Patrick L. Hastings, PS #37277

STATE OF MICHIGAN
PATRICK L. HASTINGS
PROFESSIONAL SURVEYOR
No. 37277
REGISTERED PROFESSIONAL SURVEYOR



VICINITY MAP

SCALE 1"=2000'

LEGAL DESCRIPTION

PARCEL 1:
Tax Item No. 09-09-10-401-001
Legal Description taken from First American Title Insurance Company, Title Commitment File No. 856683, Dated July 26, 2019.

That part of the Northeast 1/4 of the Southeast 1/4 of Section 10, Town 2 South, Range 6 East, Ann Arbor Township, Washtenaw County, Michigan, lying South of the South right of way line of US-23. EXCEPT, All that part of the Northeast 1/4 of the Southeast 1/4 of said Section 10, described as: Beginning at a point which is South 01 degrees 22 minutes 57 seconds East along the centerline of Nixon Road 1011.81 feet from the Northwest corner of the Northeast 1/4 of the Southeast 1/4 of said Section 10; thence North 88 degrees 37 minutes 03 seconds East, 50.00 feet; thence North 01 degrees 22 minutes 57 seconds West, 450.00 feet; thence North 88 degrees 37 minutes 03 seconds East, 25.00 feet; thence North 01 degrees 22 minutes 57 seconds West, 248.26 feet to a point on the Southerly right-of-way line of Highway US-23; thence Westerly along said right-of-way line, to the centerline of Nixon Road; thence South 01 degrees 22 minutes 57 seconds East, 707.00 feet more or less, to the Point of Beginning.

ALSO DESCRIBED BY SURVEY AS FOLLOWS:

Commencing at the S 1/4 Corner of Section 10, T2S, R6E, City of Ann Arbor, Washtenaw County, Michigan; thence N 89°56'13" E 1316.52 feet along the South line of said Section 10; thence N 00°11'20" W 1317.61 feet along the West line of the E 1/2 of the SE 1/4 of said Section 10 and the centerline of Nixon Road (variable width) to the POINT OF BEGINNING;

thence continuing N 00°11'20" W 305.30 feet along said line;
thence N 89°48'40" E 50.00 feet;
thence N 00°11'20" W 450.00 feet;
thence N 89°48'40" E 25.00 feet;
thence N 00°11'20" W 248.26 feet;
thence along the Southerly right-of-way line of U.S. 23 Highway in the following two (2) courses:

Southeasterly 178.65 feet along the arc of a circular curve to the right, radius 7442.45 feet, central angle 01°22'31", long chord S 86°08'16" E 178.65 feet;

S 85°27'00" E 1071.04 feet;

thence S 00°05'49" E 895.15 feet along the East line of said Section 10;
thence S 89°29'37" W 1319.16 feet along the South line of the NE 1/4 of the SE 1/4 of said Section 10 to the POINT OF BEGINNING. Being a part of the NE 1/4 of the SE 1/4 of said Section 10, T2S, R6E, City of Ann Arbor, Washtenaw County, Michigan, and containing 27.94 acres of land, more or less. Being subject to the rights of the public over the Westerly 33.00 feet thereof as occupied by said Nixon Road. Being subject to easements and restrictions of record, if any.

Being Subject to:

10. State Trunkline Highway US-23 is a Limited Access Highway as disclosed by instrument recorded in Liber 948, page 184. **PLOTTED**
11. Grant of Easement in favor of the City of Ann Arbor and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 5185, Page 222. **PLOTTED**
12. Terms and Conditions contained in Woodbury Club Development Agreement as disclosed by instrument recorded in Liber 5196, page 360. **BLANKET**
13. Grant of Easement in favor of Comcast of Colorado/Florida/Michigan/New Mexico/Pennsylvania/Washington, LLC and the Covenants, Conditions, and Restrictions contained in instrument recorded in Liber 5243, Page 780. **BLANKET**
14. Grant of Easement in favor of City of Ann Arbor and the Covenants, Conditions, and Restrictions contained in instrument recorded in Liber 5258, Page 247. **PLOTTED**
15. Grant of Easement in favor of City of Ann Arbor and the Covenants, Conditions, and Restrictions contained in instrument recorded in Liber 5258, Page 248. **PLOTTED**
16. Grant of Easement in favor of City of Ann Arbor and the Covenants, Conditions, and Restrictions contained in instrument recorded in Liber 5258, Page 249. **PLOTTED**
17. DTE Electric Company Underground Easement (Right of Way) No. 47083274-47118540 in favor of DTE Electric Company, a Michigan corporation and the Covenants, Conditions, and Restrictions contained in instrument recorded in Liber 5265, Page 207. **PLOTTED**
18. Any rights, title interest or claim thereof to that portion of the land taken, used or granted for streets, roads or highways.
22. Survey by Midwestern Consulting, dated September 12, 2017, last revised October 06, 2017, Job No. 12088, discloses the following:

a. Overhead utility lines crossing property and property lines.
b. Utility poles and guy wires on property.
c. Fence inside and crossing Northerly property line, outside Northerly and Southerly property lines.

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

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BRE NIXON RD ASSOCIATES LLC
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Farmington Hills, MI 48018

OWL CREEK PHASE 2

ALTA/NSPS LAND TITLE SURVEY OF A 27.94 ACRE PARCEL OF LAND LOCATED IN THE SE 1/4 OF SECTION 10, T2S, R6E, CITY OF ANN ARBOR, WASHTENAW COUNTY, MICHIGAN

2

REVISIONS:	REV. DATE
REVISED PER COMMENTS	8/14/19
REVISED PER AS-BUILT CONDITIONS	8/26/19
Revised Cert.	9/24/19
ADDED 3RD SHEET	10/6/19
ADDED ADDRESS & BLDG HGT	5/20/20

DATE: 9/13/17
SHEET 2 OF
CADD:
ENG:
PM:
TECH: KMW
12088_ALTA.DWG
FB#

JOB No. 12088

REVISED NOTES 9/3/20

M:\Civil34_Proj_2023\2015\Site Plan\12088_ALTA - Asbuilt.dwg, 3/25/2024 11:12 AM, Jim Ahnert, None
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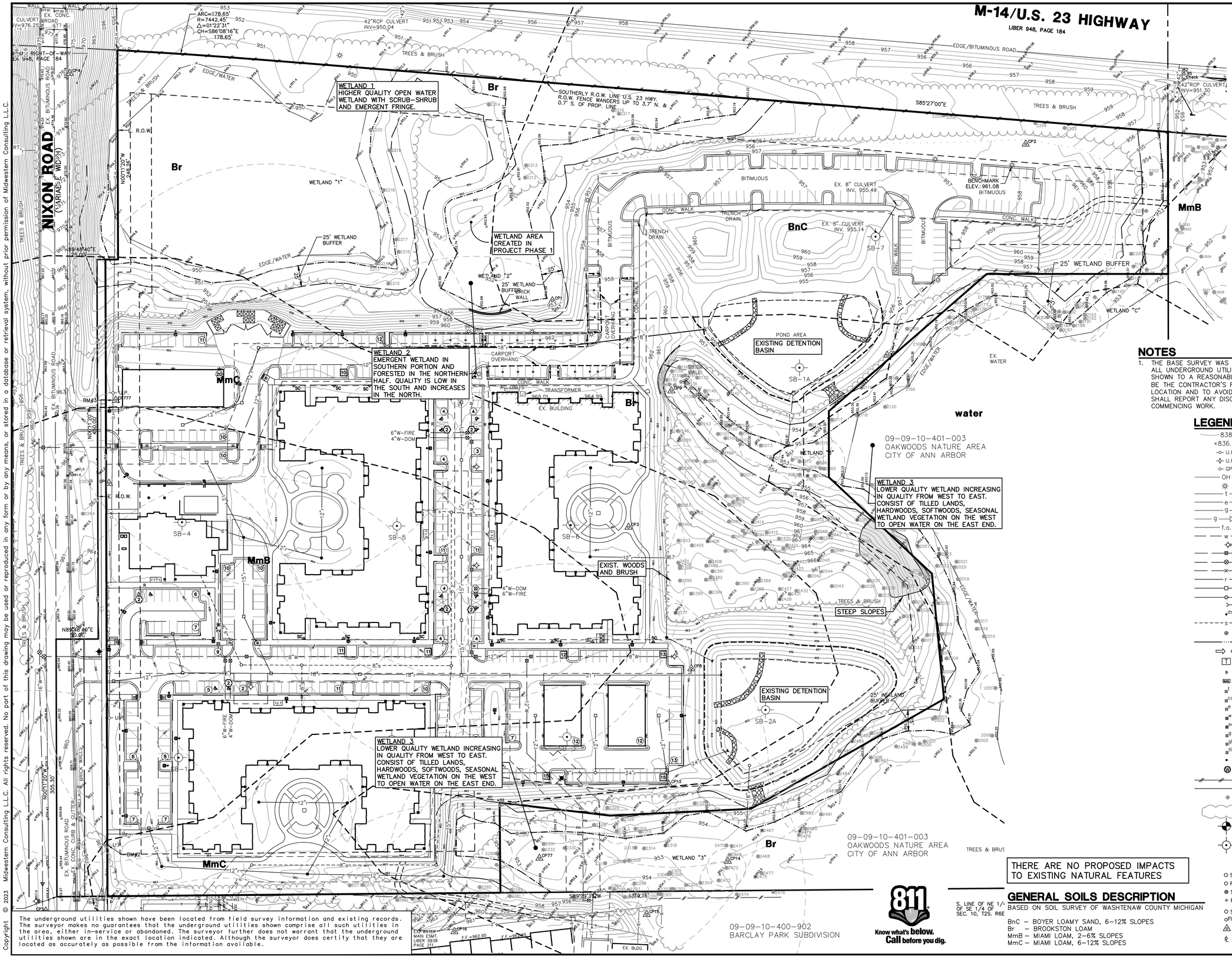

NOTES

1. THE BASE SURVEY WAS PREPARED BY MIDWESTERN CONSULTING. ALL UNDERGROUND UTILITIES AND STRUCTURES HAVE BEEN SHOWN TO A REASONABLE DEGREE OF ACCURACY AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THEIR EXACT LOCATION AND TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO COMMENCING WORK.

LEGEND

838	EXIST. CONTOUR
×836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
GP	EXIST. GUY POLE
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
g	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
w	EXIST. WATER MAIN
	EXIST. HYDRANT
	EXIST. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	EXIST. BEEHIVE INLET
	END SECTION
ds	EXIST. DOWNSPOUT
s	EXIST. SANITARY SEWER
	EXIST. CLEANOUT
	C/L OF DITCH
	DRAINAGE DIRECTION
T	ENCLOSED TRASH AREA
	SIGN
MBX	MAILBOX
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
w	WATER METER
scb	SPRINKLER CONTROL BOX
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
W	WELL
	FENCE
	GUARDRAIL
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
SB-1	SOIL BORING LOCATION
	TEST PIT LOCATION
S	SET IRON PIPE
F	FOUND IRON PIPE
M	SET MONUMENT
F	FOUND MONUMENT
S	SET IRON ROD
FIR	FOUND IRON ROD
	CONTROL PT.
	PROPERTY LINE

GENERAL SOILS DESCRIPTION

BASED ON SOIL SURVEY OF WASHTENAW COUNTY MICHIGAN

BnC – BOYER LOAMY SAND, 6–12% SLOPES
Br – BROOKSTON LOAM
MmB – MIAMI LOAM, 2–6% SLOPES
MmC – MIAMI LOAM, 6–12% SLOPES

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Know what's below. Call before you dig.

M:\Civil\3d_Pro_2023\23015\Site Plan\23015NF1.dwg, 1/25/2024 11:12 AM, Jim Ahnert, 3 NATURAL FEATURES AND SITE ANALYSIS PLAN, MCLLC PDF.pc3
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ADAM BLEZNAK
(248) 540-9300

OWL CREEK PHASE 2

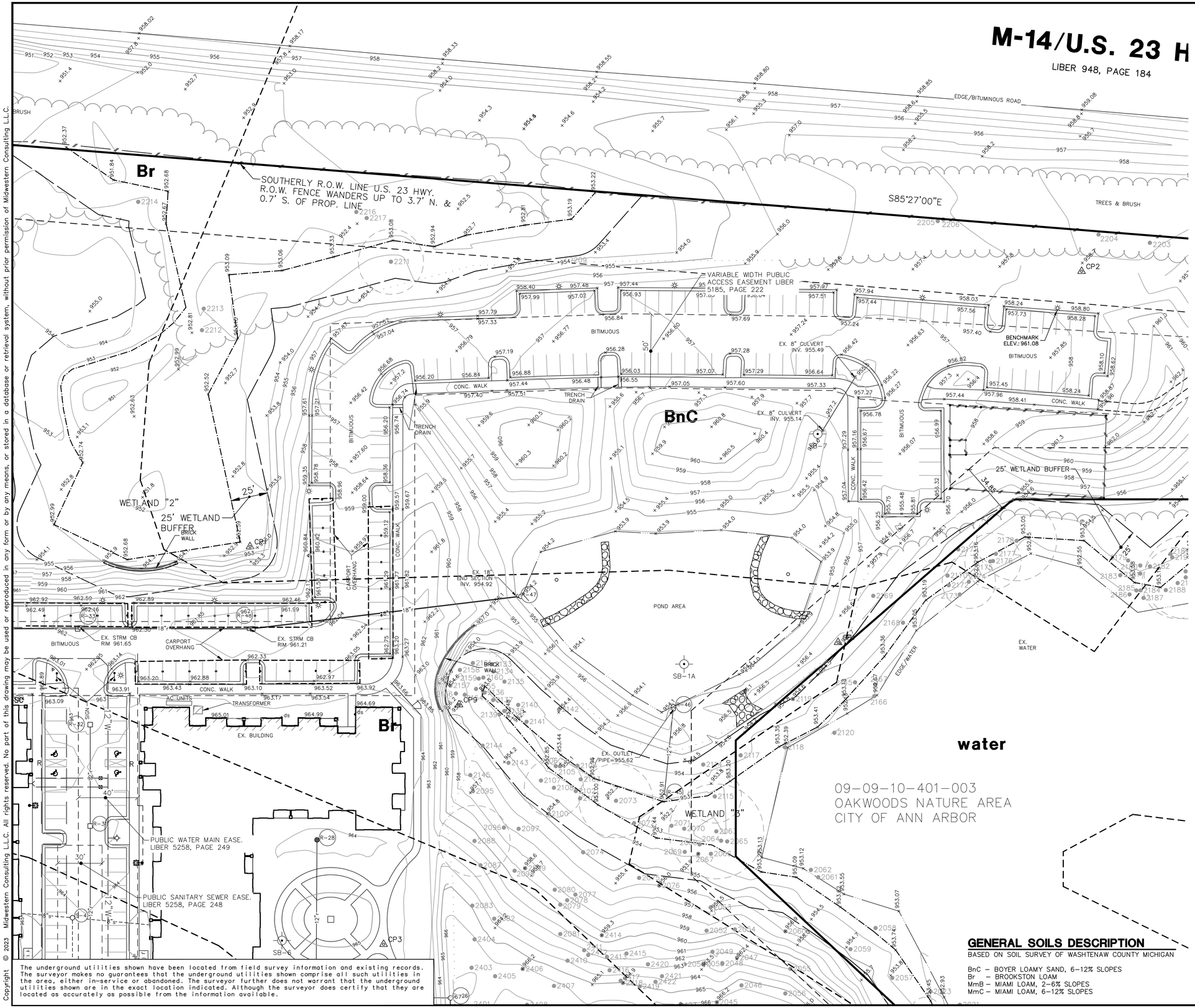
SITE PLAN FOR CITY COUNCIL AND REZONING
NATURAL FEATURES AND SITE ANALYSIS PLAN

3

JOB No. 23015
REVISIONS:

REV.	DATE

DATE: 5/17/23
SHEET 3 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015NF1



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LEGEND

- 838 — EXIST. CONTOUR
- ×836.2 — EXIST. SPOT ELEVATION
- U.P. — EXIST. UTILITY POLE
- U.P. — EXIST. UTILITY POLE W/ TRANS.
- GP — EXIST. GUY POLE
- OH — EXIST. OVERHEAD UTILITY LINE
- EXIST. LIGHT POLE
- t — EXIST. TELEPHONE LINE
- e — EXIST. ELECTRIC LINE
- g — EXIST. GAS LINE
- g — EXIST. GAS VALVE
- f.o. — EXIST. FIBER OPTIC LINE
- w — EXIST. WATER MAIN
- EXIST. HYDRANT
- EXIST. GATE VALVE IN BOX
- EXIST. GATE VALVE IN WELL
- EXIST. CURB STOP & BOX
- r — EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- EXIST. BEEHIVE INLET
- END SECTION
- ds — EXIST. DOWNSPOUT
- s — EXIST. SANITARY SEWER
- EXIST. CLEANOUT
- C/L OF DITCH
- DRAINAGE DIRECTION
- ENCLOSED TRASH AREA
- SIGN
- MAIL — MAILBOX
- TELEPHONE RISER
- cotv — CABLE TELEVISION RISER
- ELECTRIC METER
- w — WATER METER
- scb — SPRINKLER CONTROL BOX
- g — GAS METER
- glm — GAS LINE MARKER
- fiber — FIBER OPTIC MARKER
- POST
- W — WELL
- FENCE
- GUARDRAIL
- SINGLE TREE
- TREE OR BRUSH LIMIT
- SECTION CORNER
- SB-1 — SOIL BORING LOCATION
- TEST PIT LOCATION
- S — SET IRON PIPE
- F — FOUND IRON PIPE
- S — SET MONUMENT
- F — FOUND MONUMENT
- S — SET IRON ROD
- FIR — FOUND IRON ROD
- CONTROL PT.
- PROPERTY LINE

THERE ARE NO PROPOSED IMPACTS TO EXISTING NATURAL FEATURES

GENERAL SOILS DESCRIPTION

BASED ON SOIL SURVEY OF WASHTENAW COUNTY MICHIGAN

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M:\Civil3d_Pro_2023\23015\Site Plan\23015EX2.dwg, 1/25/2024 11:12 AM, Jim Ahnert, 4 EXISTING CONDITIONS PLAN, MCLC PDF pc3
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Know what's below. Call before you dig. 811

SCALE: 1" = 30'
0 30 60 90

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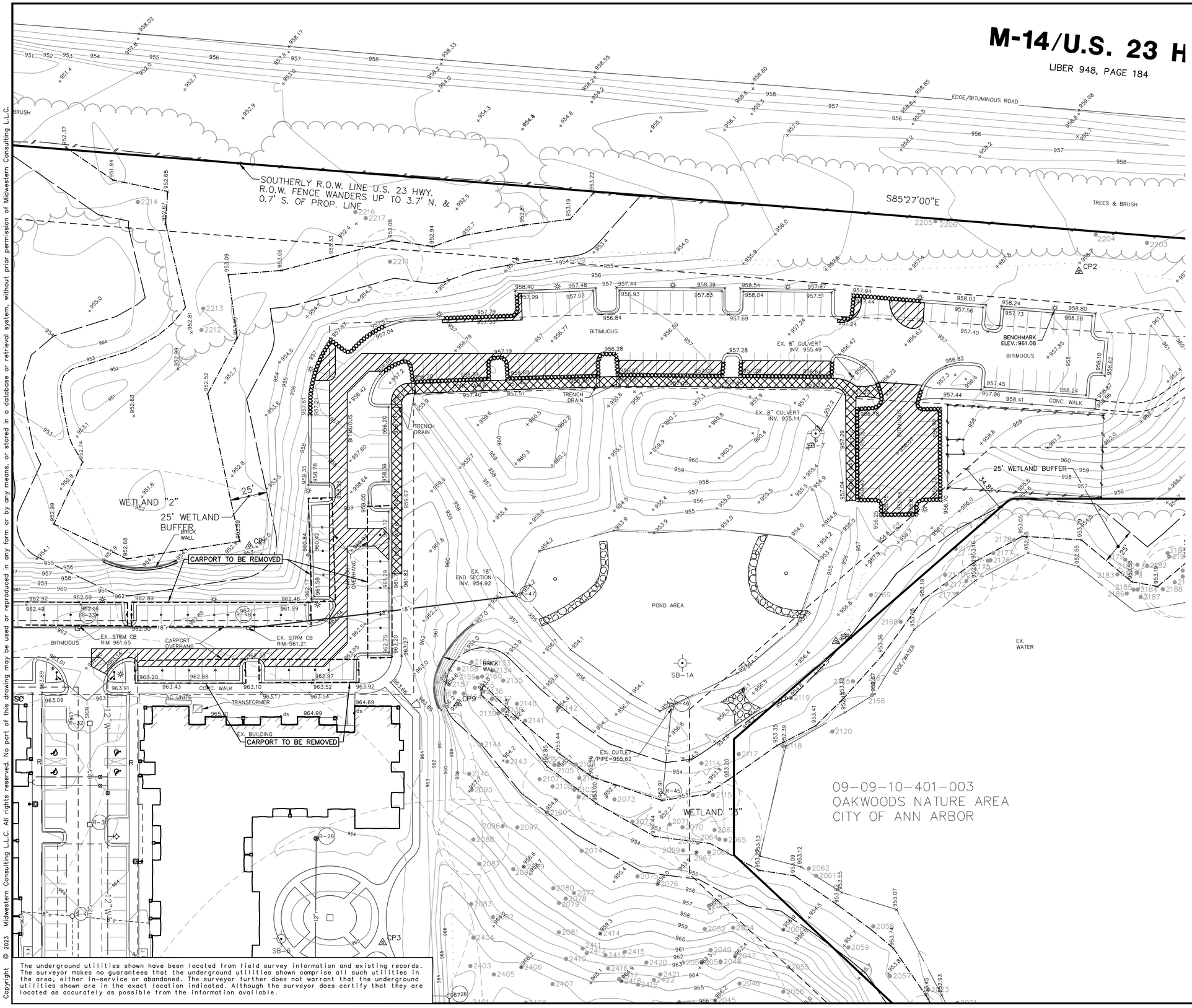
OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
EXISTING CONDITIONS PLAN

4

JOB No. 23015
REVISIONS:
PER CITY REVIEW — REV. DATE 6/21/23

DATE: 5/17/23
SHEET 4 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
23015EX2



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0 30 60 90

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- EXIST. HYDRANT
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- EXIST. CURB STOP & BOX
- fdc — FIRE DEPARTMENT CONNECTION
- r — EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- EXIST. BEEHIVE INLET
- ds — EXIST. DOWNSPOUT
- s — EXIST. SANITARY SEWER
- EXIST. CLEANOUT
- SIGN
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- catv — CABLE TELEVISION RISER
- e — ELECTRIC METER
- w — WATER METER
- POST
- EXIST. BOLLARD
- FENCE
- GUARDRAIL
- SINGLE TREE
- TREE OR BRUSH LIMIT
- SECTION CORNER
- SB-1 — SOIL BORING LOCATION
- EXIST. TEST PIT LOCATION
- S — SET IRON PIPE
- F — FOUND IRON PIPE
- S — SET MONUMENT
- F — FOUND MONUMENT
- spk — SET P.K.
- FPK — FOUND P.K.
- S — SET IRON ROD
- FIR — FOUND IRON ROD
- CONTROL PT.
- CENTERLINE
- PROPERTY LINE
- CONCRETE TO BE REMOVED
- BITUMINOUS TO BE REMOVED
- UTILITY TO BE ABANDONED
- CURB OR UTILITY TO BE REMOVED
- TREE TO BE REMOVED
- REL — ITEM TO BE RELOCATED
- REM — ITEM TO BE REMOVED

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OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
REMOVAL PLAN

5

DATE: 5/17/23
SHEET 5 OF 20
CADD:
ENG: JCA
PM: SWB
TECH: /23015RM1

JOB No. 23015
REVISIONS: PER CITY REVIEW
REV. DATE 8/31/23

M:\Civil3d_Proj_2023\23015\Site Plan\23015RM1.dwg, 3/25/2024 11:13 AM, Jim Ahnert, 5 REMOVAL PLAN, MCLLC PDF.pc3
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M:\Civil\23A_Pro_2023\2301SSP2\Site Plan\23015SP2.dwg, 3/25/2024 11:13 AM, Jim Ahnert, 6 OVERALL SITE PLAN, MCLLC PDF.pc3
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M-14/U.S. 23 HIGHWAY

LIBER 948, PAGE 184

EDGE/BITUMINOUS ROAD

TREES & BRUSH

ARC=178.65'
R=7442.45'
Δ=01°22'31"
CH=S86°08'16"E
178.65'

42"RCP CULVERT
INV=950.04

SOUTHERLY R.O.W. LINE U.S. 23 HWY.
R.O.W. FENCE WANDERS UP TO 3.7' N. &
0.7' S. OF PROP. LINE

S85°27'00"E

VARIABLE WIDTH PUBLIC
ACCESS EASEMENT LIBER
5185, PAGE 222

42"RCP CULVERT
INV=951.30

182
95
Check

SCALE: 1" = 50'

0 50 100 150

811
Know what's below.
Call before you dig.

HIGHWAY RIGHT-OF-WAY
ER 948, PAGE 184

CP4

EX. CONC. CULVERT INV=976.25

EX. BITUMINOUS ROAD

NIXON ROAD
(VARIABLE WIDTH)

TREES & BRUSH

EDGE/WATER

R.O.W.

WETLAND "1"

N01°11'20"W
24.42'

N89°48'40"E
25.00'

25' WETLAND BUFFER

EDGE/WATER

WETLAND "2"

25' WETLAND BUFFER

BRICK WALL

CP1

BITUMOUS

CONC. WALK

6 PR. CL C
BIKE PARKING

PROPOSED 5 STORY BUILDING

24 PR. CL A BIKE
PARKING IN BIKE ROOM

BITUMOUS

50'

123.23'

BENCHMARK
ELEV.=961.08
BITUMOUS

CP2

256.12'

JNC. WALK

34.88'

25' WETLAND BUFFER

WETLAND "C"

POND AREA

EDGE/WATER

EX. WATER

BRICK WALL

CP9

CP8

15'

40'

PROPOSED WATER
MAIN EASEMENT,
VARIABLE WIDTH

WETLAND "B"

09-09-10-401-003
OAKWOODS NATURE AREA
CITY OF ANN ARBOR

BIKE PARKING SUMMARY

	CL A	CL C
EX. BLDG 1	18	6
EX. BLDG 2	16	6
EX. BLDG 3	16	6
EX. CLUBHSE	0	8
PR. BLDG 4	24	12
TOTAL	74	38

GENERAL NOTES:

1. "All sidewalks shall be kept and maintained in good repair by the owner of the land adjacent to and abutting the same. Prior to the issuance of the final Certificate of Occupancy for this site, all existing sidewalks in need of repair must be repaired in accordance with city standards."

2. Sidewalks constructed in the public right-of-way and/or public paths shall meet all requirements and guidelines as set forth in the ADA Standards for Accessible Design. Note that many of the details concerning grades will need to be determined during the site plan stage in order to gain grading plan approval.

EX. BITUMINOUS ROAD
EX. CONC. CURB & GUTTER

CURB CUT

15'R

U.P.
CP777

BM#3

N89°48'40"E
50.00'

R.O.W.

16 EX. CL A
BIKE PARKING
IN BIKE ROOM

8 EX. CL C
BIKE PARKING

16 EX. CL A
BIKE PARKING
IN BIKE ROOM

BITUMOUS

CONC. WALK

AC UNITS

TRANSFORMER

EX. BUILDING

SIGN

40'

30'

PUBLIC WATER MAIN EASE.
LIBER 5258, PAGE 249

PUBLIC SANITARY SEWER EASE.
LIBER 5258, PAGE 248

CP3

6 EX. CL C
BIKE PARKING

N89°48'40"E
50.00'

CURB CUT

30'

PUBLIC WATER MAIN EASE.
LIBER 5258, PAGE 249

6 EX. CL C
BIKE PARKING

18 EX. CL A
BIKE PARKING
IN BIKE ROOM

CP13

PUBLIC SANITARY SEWER EASE.
LIBER 5258, PAGE 248

N00°11'20"W
305.30'

BRICK WALL

EX. BITUMINOUS ROAD
EX. CONC. CURB & GUTTER

U.P.

BM#2

CP5

CP77

40'

WETLAND "3"

CP14

PUBLIC WATER MAIN EASE.
LIBER 5258, PAGE 249

S89°29'37"W 1319.16'

S. LINE OF NE 1/4
OF SE 1/4 OF
SEC. 10, T2S. R6E

09-09-10-400-902
BARCLAY PARK SUBDIVISION

EX. WATER
MAIN ESMT.
LIBER 3938
PAGE 211

CP16

F.F.=962.95

F.F.=962.95

CP15

EX. BLDG.

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

M-14/U.S. 23 HIGHWAY

RIXON ROAD

EDGE/WATER

TREES & BRUSH

25' WETLAND BUFFER

OPEN SPACE PLAN

SCALE 1"=150'

OPEN SPACE
SITE AREA = 907,373 SF
TOTAL OPEN SPACE = 588,8951 SF
OPEN SPACE =64.9 %

ACTIVE (ALSO INCLUDED IN OVERALL)
124,175 SF
ACTIVE OPEN SPACE =13.7%

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ADAM BLEZNAK
(248) 540-9300

OWL CREEK PHASE 2

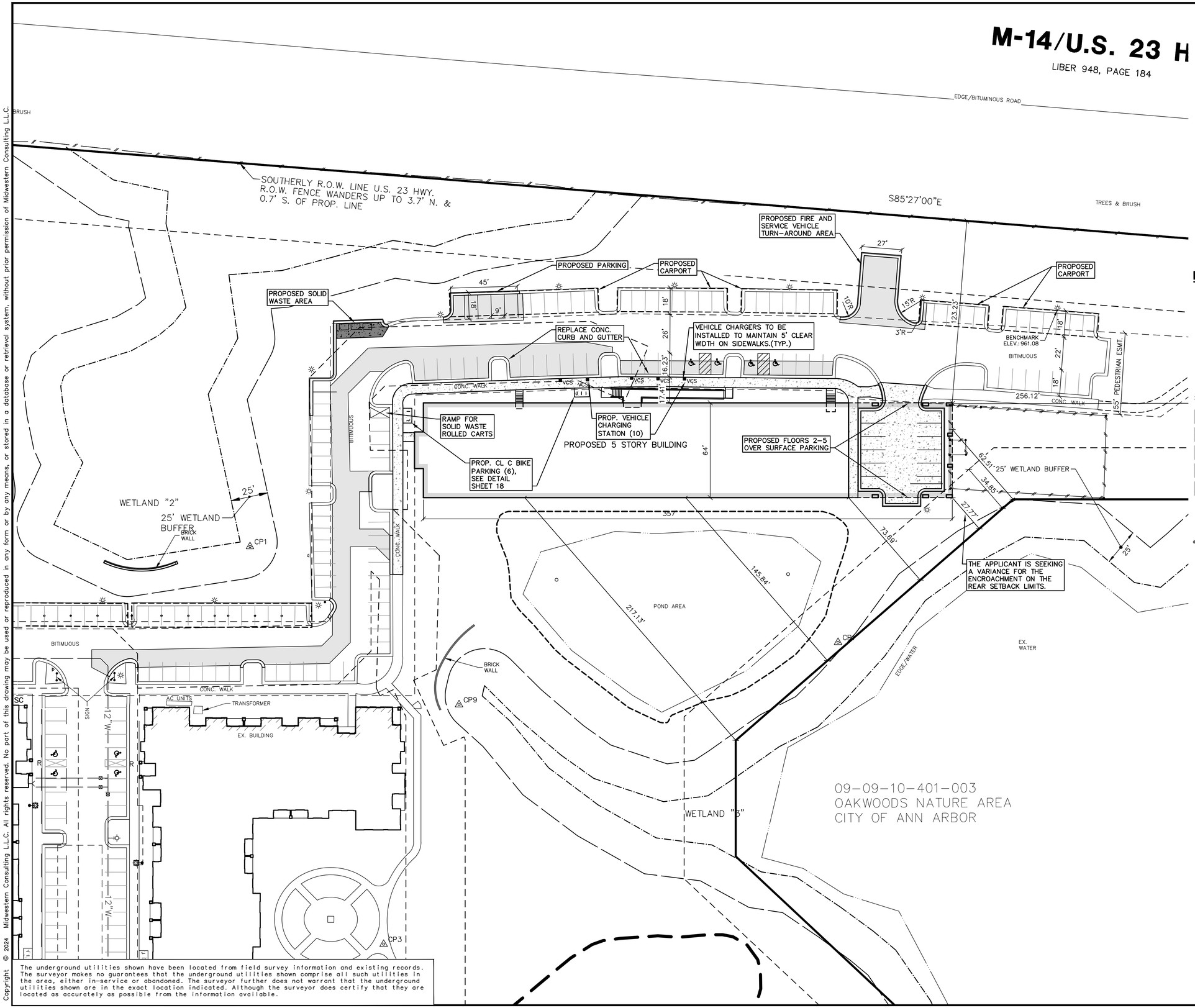
SITE PLAN FOR CITY COUNCIL AND REZONING
OVERALL SITE PLAN

6

JOB No. 23015

REVISIONS:	REV. DATE
PER CITY REVIEW	8/7/23
PER CITY REVIEW	1/30/24

DATE: 5/17/23
SHEET 6 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015SP2



SCALE: 1" = 30'

0 30 60 90

811 Know what's below. Call before you dig.

LEGEND

- NUMBER OF STANDARD PARKING SPACES IN ROW
- NUMBER OF SMALL CAR PARKING SPACES IN ROW
- NUMBER OF BARRIER FREE PARKING SPACES IN ROW
- BF — BARRIER FREE PARKING SIGN
- BFV — VAN ACCESSIBLE BARRIER FREE PARKING SIGN
- R — BARRIER FREE SIDEWALK RAMP
- PROP. CURB & GUTTER
- PROP. BITUMINOUS PAVEMENT
- PROP. CONCRETE PAVEMENT
- PROP. HEAVY DUTY CONCRETE
- PROP. GRASS PAVE DRIVE
- PROP. PAVERS
- SIGN
- PROP. SINGLE LIGHT
- PROP. DOUBLE LIGHT
- PROP. WOODCHIP PATH
- VCS — PROP. VEHICLE CHARGING STATION

NOTE:
OF THE 98 PARKING SPACES IN THE AREA OF THE PROPOSED BUILDING 10 WILL BE INSTALLED WITH CHARGING STATION, 88 OTHERS WILL BE CAPABLE.

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M:\Civil3d_Proj_2023\23015\Site Plan\23015SP1.dwg, 3/25/2024 11:13 AM, Jim Ahnert, 7 DIMENSIONAL SITE PLAN, MCLLC PDF.pc3
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OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
DIMENSIONAL SITE PLAN

7

DATE: 5/17/23
SHEET 7 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015SP1

JOB No. 23015

REVISIONS:
PER CITY REVIEW 8/31/23
PER CITY REVIEW 11/9/23

M:\Civil3_Pro_2023\23015\Site Plan\23015UP2.dwg, 3/25/2024 11:13 AM, Jim Ahnert, 8 OVERALL UTILITY PLAN, MCLLC PDF.pc3
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M-14/U.S. 23 HIGHWAY

LIBER 948, PAGE 184

NIXON ROAD
(VARIABLE WIDTH)

EX. BITUMINOUS ROAD
EX. CONC. CURB & GUTTER

HIGHWAY RIGHT-OF-WAY
LIBER 948, PAGE 184

EX. CONC. CULVERT INV=976.25

ARC=178.65'
R=7442.45'
Δ=01°22'31"
CH=S86°08'16"E
178.65'

42"RCP CULVERT
INV=950.04

TREES & BRUSH

EDGE/BITUMINOUS ROAD

EDGE/WATER

SOUTHERLY R.O.W. LINE U.S. 23 HWY.
R.O.W. FENCE WANDERS UP TO 3.7' N. &
0.7' S. OF PROP. LINE

S85°27'00"E

42"RCP CULVERT
INV=951.30

182
95.95
Check

E. R.O.W.

N00°11'20"W
246.28

WETLAND "1"

N89°48'40"E
25.00'

25' WETLAND BUFFER

EDGE/WATER

WETLAND "2"

25' WETLAND BUFFER

BRICK WALL

PROPOSED WATER MAIN

PROPOSED FIRE AND SERVICE VEHICLE TURN-AROUND AREA

PROPOSED STORM SEWER

PROPOSED 5 STORY BUILDING

PROPOSED PRIVATE SANITARY SEWER PUMP STATION

PROPOSED PRIVATE SANITARY FORCE MAIN

PROPOSED UNDERGROUND DETENTION

OUTLET CONTROL STRUCTURE

EX. 16" END SECTION INV=954.92

3" S. FM

EX. STRM MH RIM=961.65

EX. STRM MH RIM=961.21

CONNECT TO EXISTING WATER MAIN

EX. BUILDING

TRANSFORMER

CONC. WALK

BITUMUOUS

BENCHMARK
ELEV.=961.08
BITUMUOUS

123.23'

256.12'

34.84'

POND AREA

EX. OUTLET PIPE=955.62

EX. WATER

WETLAND "C"

WETLAND "3"

09-09-10-401-003
OAKWOODS NATURE AREA
CITY OF ANN ARBOR

09-09-10-400-902
BARCLAY PARK SUBDIVISION

N00°11'20"W
305.30'

N89°48'40"E
50.00'

S89°29'31"W
1319.16'

S. LINE OF NE 1/4 OF SE 1/4 OF SEC. 10, T2S. R6E

EX. WATER MAIN ESMT. LIBER 3938 PAGE 211

F.F.=962.95

F.F.=962.95

EX. BLDG.

U.P.
BM#1
CP777

BM#2

BM#3

R.O.W.

6"W-FIRE
4"W-DOM

4"W-DOM
6"W-FIRE

CP1 CP2 CP3 CP4 CP5 CP6 CP8 CP9 CP13 CP14 CP15 CP16 CP77

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SCALE: 1" = 50'

0 50 100 150

811
Know what's below.
Call before you dig.

LEGEND

U.P.	EXIST. UTILITY POLE
GP	EXIST. GUY POLE
	GUY WIRE
	ELEC. TRANSFORMER
	EXIST. GENERATOR
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
	PROP. LIGHT POLE
	PROP. BUILDING LIGHT
t	EXIST. TELEPHONE LINE
T	PROP. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
E	PROP. ELECTRIC LINE
g	EXIST. GAS LINE
G	PROP. GAS LINE
g	EXIST. GAS VALVE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
fdc	EXIST. FIRE DEPT. CONNECTION
FDC	PROP. FIRE DEPT. CONNECTION
KB	PROP. KNOXBOX
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	EXIST. BEEHIVE INLET
	PROP. BEEHIVE INLET
RD	PROP. ROOF DRAIN
ds	EXIST. DOWNSPOUT
DS	PROP. DOWNSPOUT
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
w	WATER METER
g	GAS METER
VCS	PROP. VEHICLE CHARGING STATION

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OWL CREEK PHASE 2

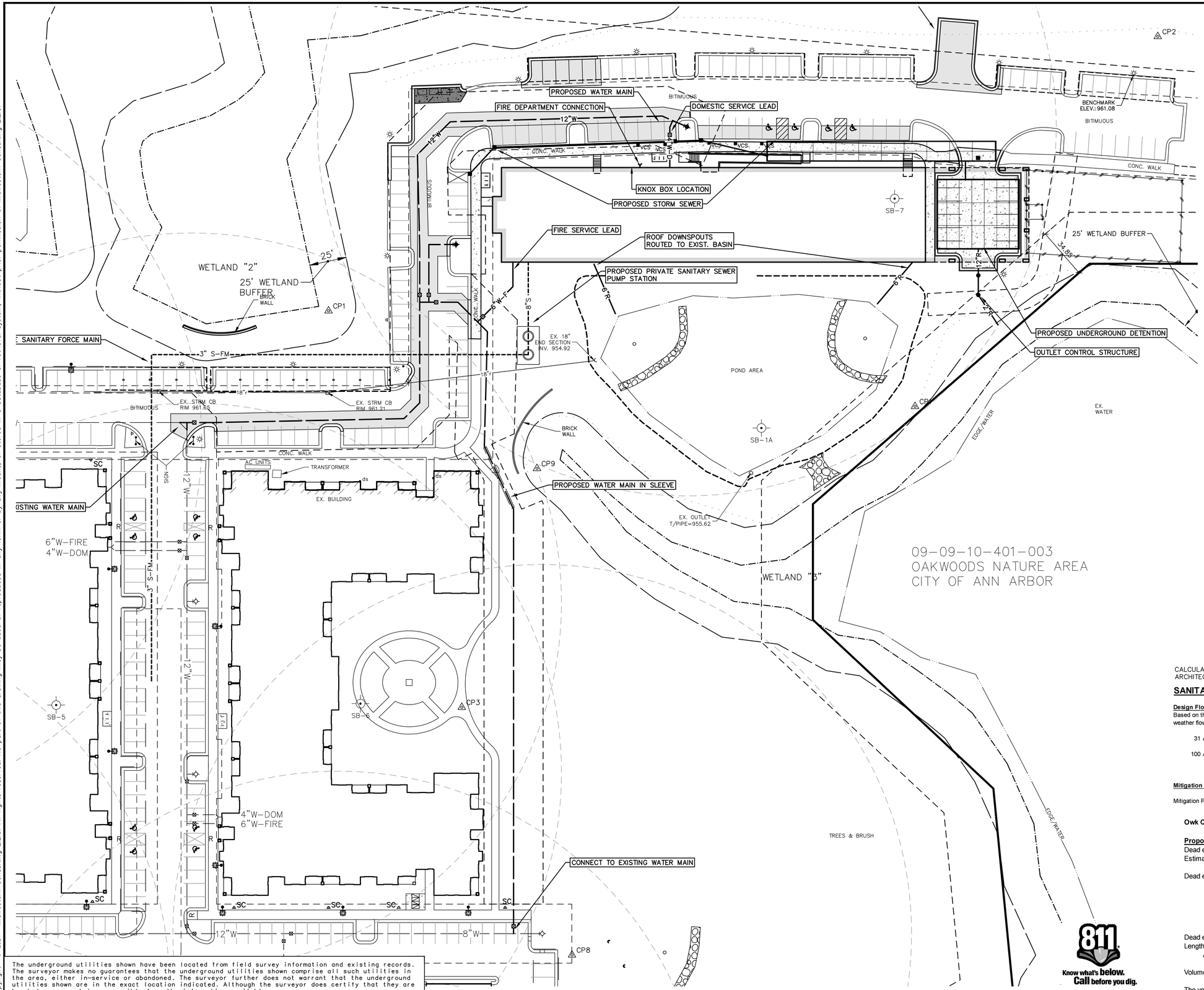
SITE PLAN FOR CITY COUNCIL AND REZONING
OVERALL UTILITY PLAN

8

JOB No. 23015

DATE: 5/17/23
SHEET 8 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015UP2

REVISIONS:	REV. DATE
PER CITY REVIEW	9/7/23
PER CITY REVIEW	3/25/24



SCALE: 1" = 30'

0 30 60 90

LEGEND

U.P.	EXIST. UTILITY POLE
GP	EXIST. GUY POLE
	GUY WIRE
	ELEC. TRANSFORMER
	EXIST. GENERATOR
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
	PROP. LIGHT POLE
	PROP. BUILDING LIGHT
t	EXIST. TELEPHONE LINE
T	PROP. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
E	PROP. ELECTRIC LINE
g	EXIST. GAS LINE
G	PROP. GAS LINE
g	EXIST. GAS VALVE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
fdc	EXIST. FIRE DEPT. CONNECTION
FDC	PROP. FIRE DEPT. CONNECTION
KB	PROP. KNOXBOX
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	EXIST. BEEHIVE INLET
	PROP. BEEHIVE INLET
RD	PROP. ROOF DRAIN
ds	EXIST. DOWNSPOUT
DS	PROP. DOWNSPOUT
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
w	WATER METER
g	GAS METER
VCS	PROP. VEHICLE CHARGING STATION

UTILITY PLAN NOTES:

1. Domestic water and fire suppression water services are to be connected to proposed 12" water main. The need for Booster pumps will be determined. Refer to MEP plans for booster pump specifications.
2. The sanitary sewer lead will route to the proposed pump station. A force main will then pump to the existing gravity sewer between existing buildings 2 and 3.
3. The proposed storm detention tanks will be placed under the building overhang on the west end of the proposed structure. It will be designed to current WCWRC standards.
4. The proposed building's sump pump will discharge to the storm water management system.
5. Public utility easements shall be clear of obstructions such as buildings, retaining walls, dumpster enclosures, or any other object with a foundation or footing. Existing structures located within proposed utility easements will be the responsibility of the property owner in the event of utility main maintenance, repair or replacement.
6. There are no proposed firewalls proposed for the building construction.

CALCULATIONS ARE ESTIMATED, TO BE UPDATED WITH FINAL ARCHITECTURAL PLANS

SANITARY SEWER FLOW MITIGATION CALCULATIONS

Design Flow

Based on the City of Ann Arbor's sanitary sewer flow evaluation Table 'A', the design dry weather flow rate will be:

31 Apartments (Under 600 Square Feet) @	175	gpd =	5425 gpd
100 Apartments (601-1200 Square Feet) @	250	gpd =	25000 gpd
		Total	30425 gpd

Mitigation Flow

Mitigation Peak Flow 30425 gpd x 4(peaking factor) x 1.1(recovery) = 133870 gpd
= 93.0 gpm

Owk Creek Phase 2 7/21/2023

Proposed New Building Construction

Dead end watermain trun over calculations
Estimated time for water volume turnover in dead end main

Dead end watermain has

31 Apartments (Under 600 Sf) @	175 gpd =	5425 gpd
100 Apartments (601 - 1200 Sf) @	250 gpd =	25000 gpd
		30425 gpd
		4067.2 CF/day

Dead end watermain diameter is 12 "
Length of dead end is 290 LF
A = 0.785 SF

Volume of watermain 0.785 SF x 290 LF = 228 CF

The volume of the water with turn over 17.9 times daily

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OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
UTILITY PLAN

9

DATE: 5/17/23
SHEET 9 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015UP1

JOB No. 23015

REVISIONS:	REV. DATE
PER CITY REVIEW	9/7/23
PER CITY REVIEW	1/19/24
PER CITY REVIEW	3/5/24

M:\Civil 3d_Pro_2023\23015\Site Plan\23015UP1.dwg, 3/25/2024 11:14 AM, Jim Ahnert, 9 UTILITY PLAN, MCLLC PDF.pc3
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M-14/U.S. 23 H

LIBER 948, PAGE 184

SOUTHERLY R.O.W. LINE U.S. 23 HWY.
R.O.W. FENCE WANDERS UP TO 3.7' N. & 0.7' S. OF PROP. LINE

S85°27'00"E

EDGE/BITUMINOUS ROAD

TREES & BRUSH

CONCRETE WASHOUT

BENCHMARK
ELEV.: 961.08

BITUMINOUS

CONC. WALK

STAIRS

RAMP

STAIRS

PROPOSED BUILDING
FFE= 960.00

25' WETLAND BUFFER

WETLAND "2"

25' WETLAND BUFFER

BRICK WALL

EX. 18" END SECTION
INV. 954.92

POND AREA

55t

BASIN MAINTENANCE ACCESS PATH

EX. WATER

EDGE/WATER

SB-1A

EX. OUTLET
PIPE=955.62

09-09-10-401-003
OAKWOODS NATURE AREA
CITY OF ANN ARBOR

WETLAND "3"

EX. STRM CB
RIM 961.85

EX. STRM CB
RIM 961.21

AC UNITS

TRANSFORMER

EX. BUILDING

SB-6

CP1 CP2 CP3

59t

12" W

8" S.W.L.

6" W

3" S-FM

2" W

LEGEND

838	EXIST. CONTOUR
838	PROP. CONTOUR
×836.2	EXIST. SPOT ELEVATION
36.60×	PROP. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
	ELEC. TRANSFORMER
	EXIST. AC UNIT
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
	PROP. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
g	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
fdc	EXIST. FIRE DEPARTMENT CONNECTION
FDC	PROP. FIRE DEPARTMENT CONNECTION
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	EXIST. BEEHIVE INLET
	PROP. BEEHIVE INLET
RD	PROP. ROOF DRAIN
	END SECTION
ps	PROP. DOWNSPOUT
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	C/L OF DITCH
	SIGN
	SINGLE TREE
	TREE OR BRUSH LIMIT
	FENCE
	SILTFENCE
	LIMITS OF DISTURBANCE
	CONSTRUCTION FENCE

SCALE: 1" = 30'

0 30 60 90

SOIL EROSION CONTROL NOTES

1. All soil erosion control measures shall comply with the current City of Ann Arbor ordinances, Washtenaw County standards and specifications for soil erosion and sedimentation control, and State of Michigan "Soil Erosion and Sedimentation Control Act – P.A. 347".
2. Prior to commencing earthmoving operations, the grading contractor shall install the temporary catch basin filter(s) shown on the plans.
3. The removal of trapped sediment and the cleanout or replacement of clogged storm may be necessary after each storm event during the project.
4. Only upon stabilization of all disturbed areas may the temporary gravel filters be removed. All storm sewers must be also cleaned of all sediment.
8. All inlets and catch basins will have sediment filters installed after their construction. These filters will be maintained until all areas around the structure have been stabilized.
9. The Contractor will maintain all necessary soil erosion control devices until soil stabilization has occurred.
10. Appropriate emergency access will be provided during construction.
11. The estimated cost of soil erosion control measures is $12,200.
12. The estimated cost to protect all soil surfaces from erosion should construction discontinue is $4,500
13. External streets will be immediately cleaned of any tracked mud following each mud-tracking occurrence.
14. Estimated project earthwork is 4,000 CYD excavation and 0 CYD fill.
15. Dewatering operations during construction, if necessary, must be done per City requirements including sediment control and disposal.
16. Final locations and dimensions of the mud tracking mat and concrete washout area are to be determined by the contractor subject to City approval.

MAINTENANCE PROGRAM FOR SOIL EROSION CONTROLS

1. The Owner shall be responsible for maintaining the permanent soil erosion control measures. Maintenance responsibilities shall become part of any sales or exchange agreement for the land on which the permanent SESC measures are located.

SOIL EROSION CONTROL MEASURES

t = temporary p = permanent

6	SEEDING WITH MULCH AND/OR MATTING	16	CURB & GUTTER	59	C.B./INLET FILTER
13	RIPRAP, RUBBLE, GABIONS	54	CONSTRUCTION FENCE OR SNOW FENCE	60	MUD TRACKING MAT
15	PAVING	55	GEOTEXTILE SILT FENCE		

811 Know what's below. Call before you dig.

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M:\Civil3d_Proj_2023\23015\Site Plan\23015SP1.dwg, 3/26/2024 11:14 AM, Jim Ahner+, 10 PROPOSED GRADING AND SOIL EROSION CONTROL PLAN_MCLLC PDF.pc3

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ADAM BLEZNAK
(248) 540-9300

OWL CREEK PHASE 2

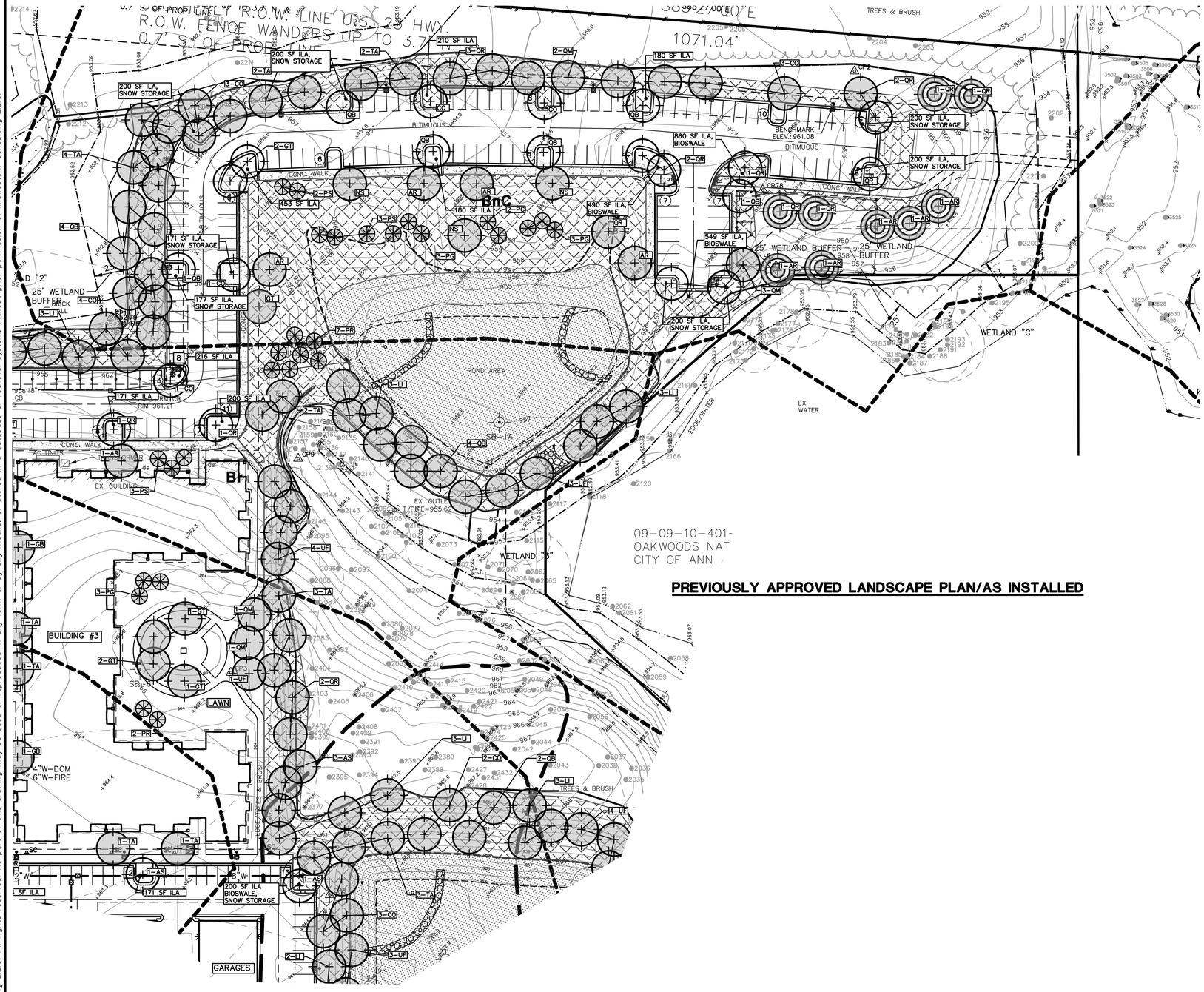
SITE PLAN FOR CITY COUNCIL AND REZONING
PROPOSED GRADING AND SOIL EROSION CONTROL PLAN

10

DATE: 5/17/23
SHEET 10 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015SP1

REVISIONS:	REV. DATE
PER CITY REVIEW	4/5/23
PER CITY REVIEW	6/7/23

JOB No. 23015



PREVIOUSLY APPROVED LANDSCAPE PLAN/AS INSTALLED

THE CURRENT BUILDING CONSTRUCTION DOES NOT PROPOSE ANY NEW REQUIRED LANDSCAPING. THE PLAN PROPOSES RELOCATION OF PREVIOUSLY PLACED LANDSCAPE PLANTINGS WHERE POSSIBLE. IT NOT POSSIBLE, REPLACEMENT PLANTINGS OF SAME SPECIES WILL BE PLANTED. PLANTING LABELS NOTED WITH "-REL" ARE TRANSPLANTED FROM PREVIOUSLY PLACED TREES.

THERE ARE NO PROPOSED IMPACTS TO EXISTING NATURAL FEATURES

SCALE: 1" = 40'

0 40 80 120

811 Know what's below. Call before you dig.

LANDSCAPE LEGEND

- PROPOSED CANOPY TREE
- PROPOSED EVERGREEN TREE
- PROPOSED DECIDUOUS SHRUBS
- PROPOSED EVERGREEN SHRUBS
- PROPOSED CANOPY TREE (INTERIOR VUA)
- PROPOSED CANOPY TREE (RIGHT-OF-WAY SCREEN)
- PROPOSED CANOPY TREE (CONFLICTING LAND USE BUFFER)
- PROPOSED EVERGREEN TREE (CONFLICTING LAND USE BUFFER)
- PROPOSED CANOPY TREE (LANDMARK/WOODLAND REPLACEMENT)
- PROPOSED EVERGREEN TREE (LANDMARK/WOODLAND REPLACEMENT)
- FIRST FLUSH BASIN/DETENTION POND/ WETLAND SEED MIX
- MDOT STANDARD SPECIFICATION SEED MIX THM
- BIOSWALE AREA
- LANDMARK CONSTRUCTION REMOVAL REPLACEMENT MITIGATION
- -REL RELOCATED/TRANSPLANTED TREE

I. PARKING LOT LANDSCAPING:

Previous Site Plan
Total Vehicular Use Area (V.U.A.) = 172,744 SF

Interior Landscape Area Required = 1:15 SF
Total Interior Landscape Area Required = 11,516 SF
Total Interior Landscape Area Provided = 11,871 SF

50% bio-retention area required = 6,055 SF
Bio-retention area provided = 6,192 SF

49 Trees Required / 59 Trees Provided

Proposed Site Modifications
Total Vehicular Use Area (V.U.A.) =
An increase of 1,587 sf increases the total site VUA to 174,331 SF

Interior Landscape Area Required = 1:15 SF
Total Interior Landscape Area Required = 11,622 SF
Total Interior Landscape Area Provided = 11,871 SF
No changes are proposed

50% bio-retention area required = 6,055 SF
Bio-retention area provided = 6,192 SF

49 Trees Required / 59 Trees Provided

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M:\Civil34_Proj_2023\23015\Site Plan\23015LP1.dwg, 3/25/2024 11:14 AM, Jim Ahnert, 11 PREVIOUSLY APPROVED LANDSCAPE PLAN, MCLLC PDF.pc3
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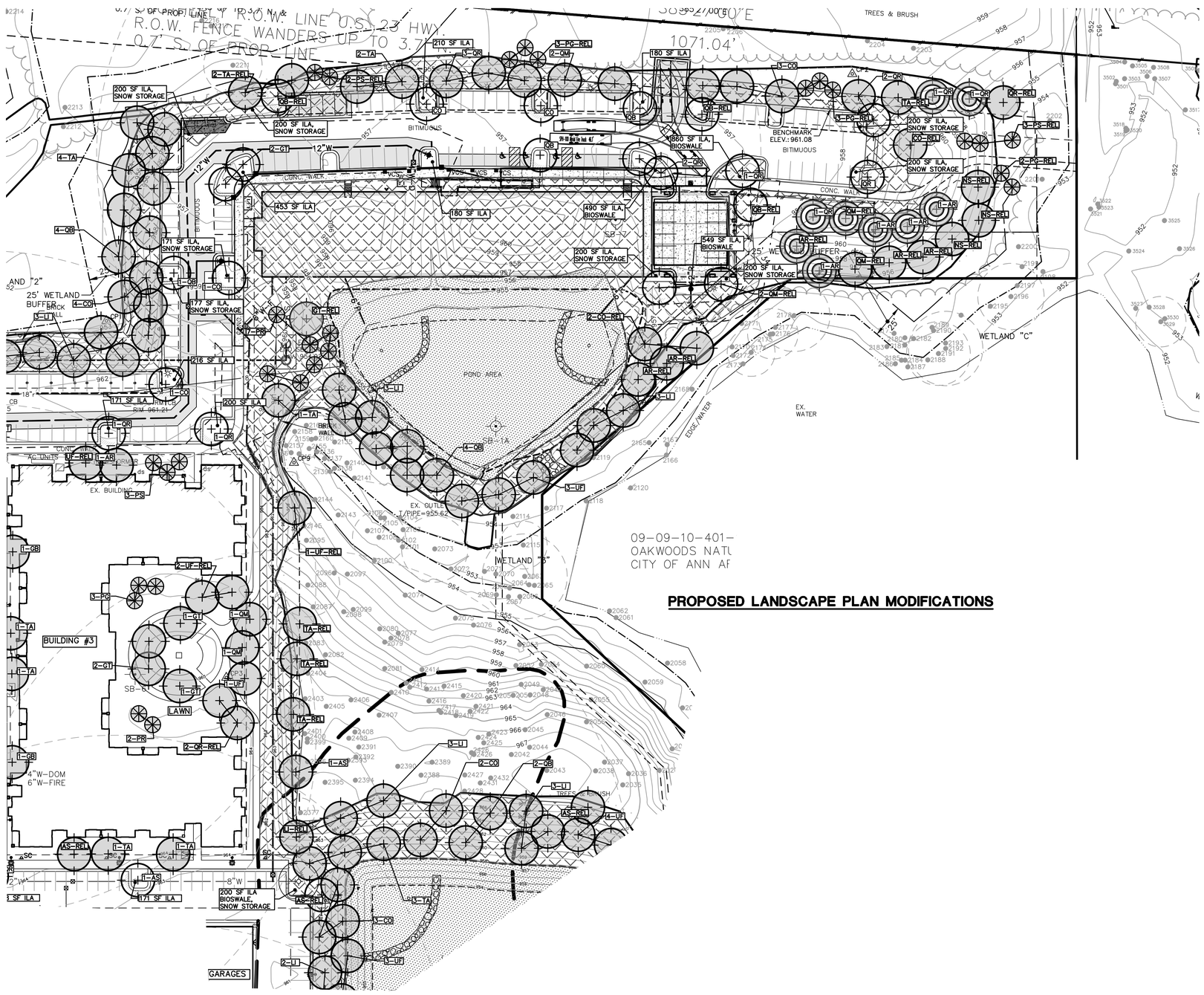
PHASE 2
OWL CREEK PH
SITE PLAN FOR CITY COUNCIL AN REZONING
PREVIOUSLY APPROVED LANDSC LANDSCAPE PLAN

11

JOB No. 23015
DATE:
SHEET 11 OF 20
CADD:
ENG. JCA
PM: SWB
TECH:
23015LP1

REVISIONS:
PER CITY REVIEW 8/31/23



PROPOSED LANDSCAPE PLAN MODIFICATIONS

THE CURRENT BUILDING CONSTRUCTION DOES NOT PROPOSE ANY NEW REQUIRED LANDSCAPING. THE PLAN PROPOSES RELOCATION OF PREVIOUS LANDSCAPE PLANTINGS WHERE POSSIBLE. IT NOT POSSIBLE, REPLACEMENT PLANTINGS OF SAME SPECIES WILL BE PLANTED. PLANTING LABELS NOTED WITH "-REL" ARE TRANSPLANTED FROM PREVIOUSLY PLACED TREES.

THERE ARE NO PROPOSED IMPACTS TO EXISTING NATURAL FEATURES

SCALE: 1" = 40'

0 40 80 120

Know what's below. Call before you dig.

LANDSCAPE LEGEND

- PROPOSED CANOPY TREE
- PROPOSED EVERGREEN TREE
- PROPOSED DECIDUOUS SHRUBS
- PROPOSED EVERGREEN SHRUBS
- PROPOSED CANOPY TREE (INTERIOR VUA)
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M:\Civil3d_Proj_2023\23015\Site Plan\23015LP1.dwg, 3/25/2024 11:14 AM, Jim Ahnert, 12 PROPOSED LANDSCAPE PLAN MODIFICATIONS, MCLLC PDF.pc3
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OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
PROPOSED LANDSCAPE PLAN MODIFICATIONS

12

JOB No. 23015

REVISIONS:	REV. DATE
PER CITY REVIEW	6/7/23
PER CITY REVIEW	1/9/24

DATE:
SHEET 12 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
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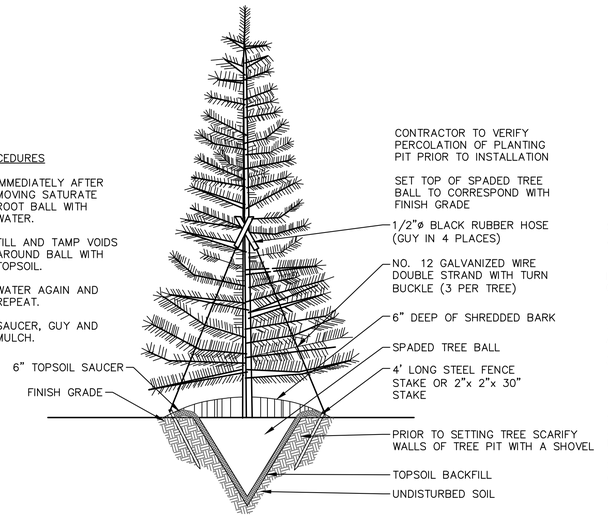
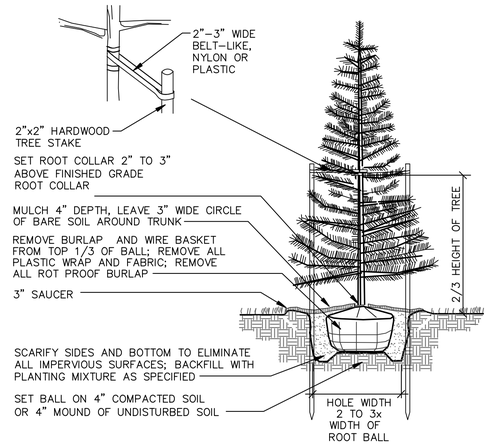


EVERGREEN TREE - TRANSPLANTING DETAIL

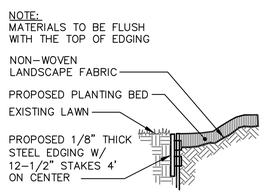
NOT TO SCALE

NOTE: A: STAKING IS ONLY REQUIRED IF THE SITE IS WINDY OR THE TREES ARE GREATER THAT 3" CALIPER. IF TREES MUST BE STAKED, THE STAKED SHALL BE REMOVED IN ONE YEAR.



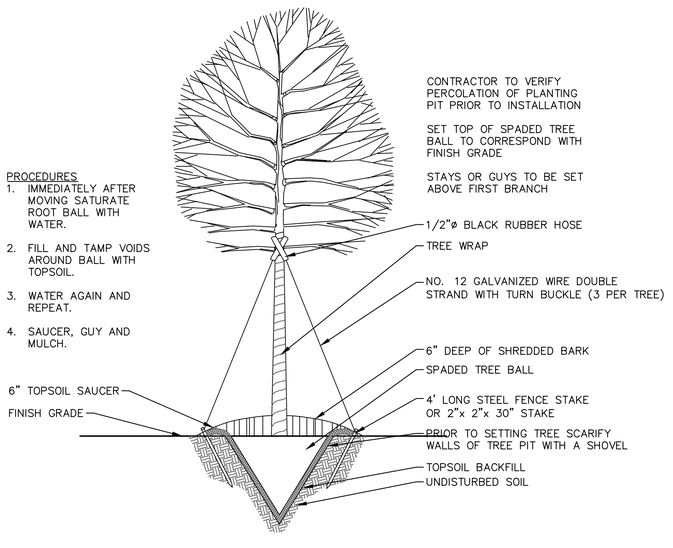
EVERGREEN TREE PLANTING DETAIL

NOT TO SCALE



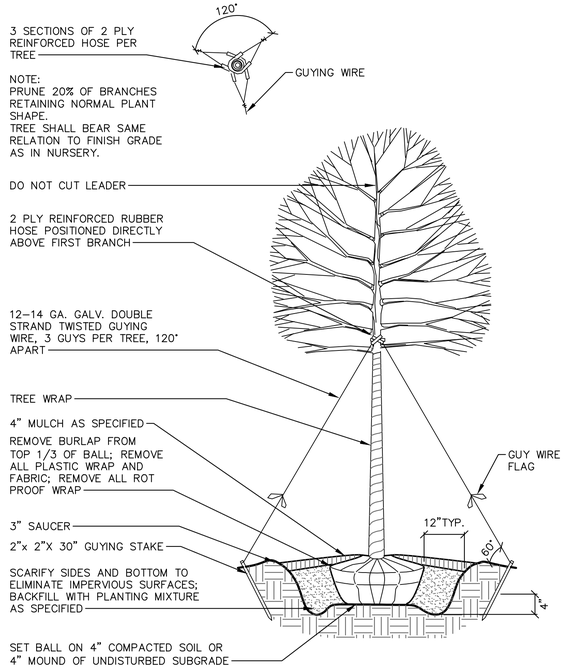
STEEL EDGING DETAIL

NOT TO SCALE



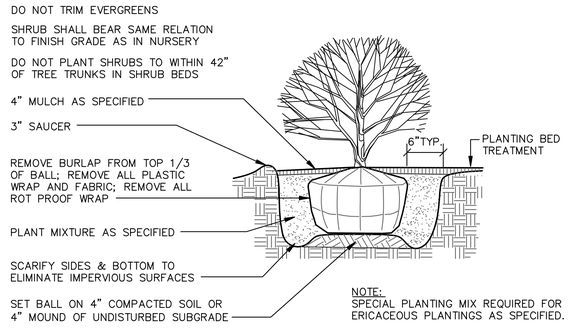
DECIDUOUS TREE - TRANSPLANTING DETAIL

NOT TO SCALE



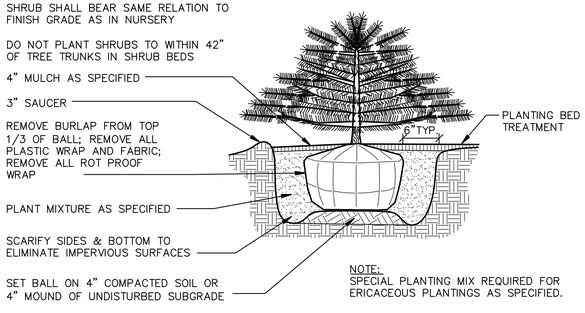
DECIDUOUS TREE – PLANTING DETAIL

SCALE : NTS



SHRUB PLANTING DETAIL

NOT TO SCALE



EVERGREEN SHRUB PLANTING DETAIL

NOT TO SCALE

LANDSCAPE NOTES

1. For any plant quantity discrepancies between the plan view and the plant schedules, the plant schedule shall take precedence.
2. Plant materials shall be selected and installed in accordance with standards established by the City of Ann Arbor.
3. In-ground automatic irrigation shall be provided for all landscaped planting or water outlets shall be provided within 150 feet of all required plantings.
4. All diseased, damaged or dead material shown on the site plan as proposed plantings shall be replaced by the end of the following growing season.
5. Restore disturbed areas with a minimum of four (4) inches of topsoil and then seed/ fertilize/mulch.
6. All disturbed areas not to be seeded with seed mixes identified on the Landscape Plan shall be lawn areas. Fertilizer for the initial installation of lawns shall provide not less than one (1) pound of actual nitrogen per 1,000 sq ft of lawn area and shall contain not less than two percent (2%) potassium and four percent (4%) phosphoric acid.
   Lawn (turfgrass) seed mix shall consist of:
   - 15% Rugby Kentucky Bluegrass
   - 10% Park Kentucky Bluegrass
   - 40% Ruby Creeping Red Fescue
   - 15% Pennifine Perennial Ryegrass
   - 20% Scaldis Hard Fescue

   Seed shall be applied at a rate of five pounds (5 lbs) per 1000 sq ft. Mulch within 24 hours with two (2) tons of straw per acre, or 71 bales of excelsior mulch per acre. Anchor straw mulch with spray coating of adhesive material applied at the rate of 150 gals. / acre.
7. After the first growing season, only fertilizers that contain NO phosphorus shall be used on the site.
8. All seeded areas with slopes less than 1:3 (one vertical foot for every 3 horizontal feet) shall be mulched with straw mulch at the rate of two (2) bales per 1,000 square feet. All seeded areas with slopes greater than 1:3 shall be seeded and biodegradable erosion control blanket North American Green SC150, or equivalent, shall be applied with biodegradable stakes.
9. Deciduous plants shall be planted between March 1 and May 15 and from October 1 until the prepared soil becomes frozen. Evergreen plants shall be planted between March 1 and June 1 and from August 15 to September 15.
10. All planting beds are to receive four (4) inches of shredded hardwood bark mulch.
11. All trees to be located a minimum of 10 feet from public utilities.
12. All single trunk, deciduous trees shall have a straight and a symmetrical crown with a central leader. One sided trees or those with thin or open crowns shall not be accepted.
13. All evergreen trees shall be branched fully to the ground, symmetrical in shape and have not been sheared in the last three (3) growing seasons.
14. All compacted subgrade soils in proposed landscape areas shall be tilled to a minimum 12-inch depth prior to placement of topsoil, geotextile fabric, or other planting media as specified.
15. Proposed trees will be planted a minimum of 15 feet apart.
16. Planting Soil: Existing, in-place or stockpiled topsoil. Supplement with imported topsoil as needed. Verify suitability of existing surface soil to produce viable planting soil. Final approval of soil composition shall be provided by the landscape contractor. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments to produce planting soil:
    a. Ratio of Loose Compost to Topsoil by Volume: 1:4.
    b. Weight of Lime per 1000 Sq. Ft.: Amend with lime only on recommendation of soil test to adjust soil pH.
    c. Weight of Sulfur or Aluminum Sulfate per 1,000 Sq. Ft.: Amend with sulfur or aluminum sulfate only on recommendation of soil test to adjust soil pH.
    d. Volume of Sand: Amend with sand only on recommendation of Landscape Architect to adjust soil texture.
    e. Weight of Slow-Release Fertilizer per 1,000 Sq. Ft.: Amend with fertilizer only on recommendation of soil test to adjust soil fertility.
17. Snow storage areas are located along the edges and corners of parking areas as shown on the plan.
18. All species deviations must be approved in writing by the City of Ann Arbor prior to installation.
19. The City of Ann Arbor has adopted an ordinance limiting phosphorus in fertilizer. To assist in compliance with the State mandated TMDL for phosphorus within the Middle Huron River basin. Applications of fertilizer beyond the initial topsoil and seeding shall be a fertilizer with no phosphorus.

Maintenance:

1. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
2. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
3. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
4. Contractor shall warranty all plant material and trees to remain alive and be in healthy, vigorous and like new condition for the specified period from installation to Substantial Completion. The entire Landscaping Project, including but not limited to: plants (perennials), trees, shrubs, mulches, shrubs, etc are to be under Warranty for One Year after Substantial Completion date of the Project. At the end of the specified One Year Warranty period the Owner's Representative will inspect plant material for compliance. Contractor shall replace, in accordance with the drawings and specifications, all plants, trees, shrubs, etc or as determined by the Owner's Representative, are in an unhealthy or unsightly condition. Warranty shall not include damage or loss of plants, trees, and shrubs caused by fires, floods, freezing rains, lightning storms, or winds over 75 miles per hour, acts of vandalism or negligence on the part of the owner, or any other incident beyond landscape contractor's control.
5. Watering: The contractor shall keep seed moist for optimum plant growth (1" of total water per week, including rainfall) until the grass and/or flowers are four (4) inches high typical.
6. Protection from traffic and erosion in newly seeded areas is the responsibility of the contractor. Safety fences and/or silt fence with appropriate signage may be used at the contractor's expense until the grasses and flowers are fully established.
7. Erosion shall be repaired by the contractor.
8. Turf installations shall meet the following criteria as determined by Owner:

a. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
b. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
c. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

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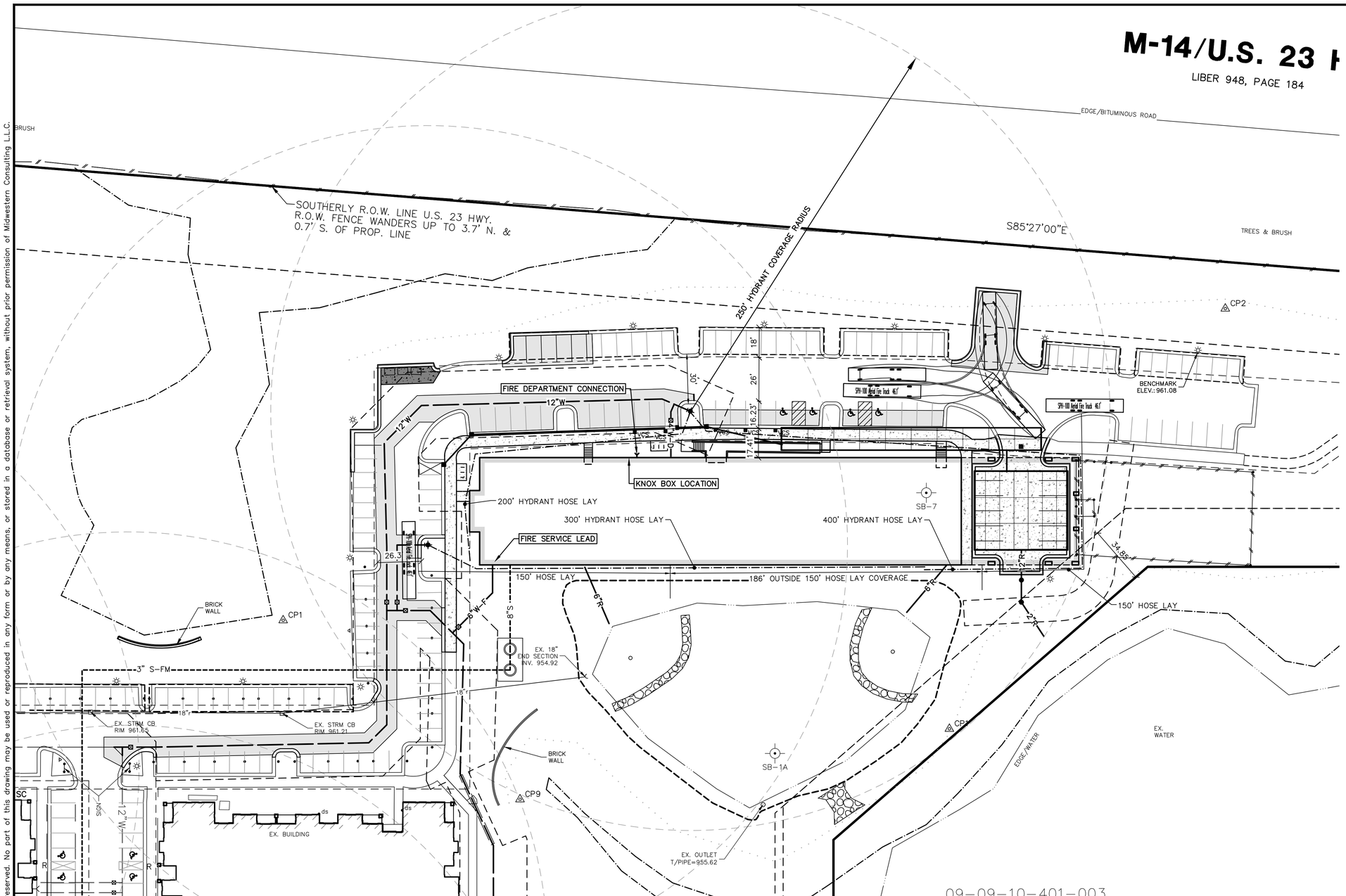
OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
LANDSCAPE NOTES AND DETAILS

13

DATE: 5/17/23
SHEET 13 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015012

JOB No. 23015
REVISIONS:
REV. DATE



FIRE PROTECTION PLAN

SCALE: 1" = 30'

0 30 60 90

811 Know what's below. Call before you dig.

FIRE PROTECTION PLAN NOTES:

1. Water services are to be separate domestic and fire lines.
2. Addressing: numerics shall be a minimum of 4 inches in height and clearly visible when approaching the building.
3. Flow requirements: flow shall comply with NFPA 13 standards and shall meet 2015 International Fire Code (IFC) standards found in Appendix B. Table B 105.1 of the code.
4. Fire department connections (FDC's) shall be within 100 feet of a hydrant.
5. Fire department connection (FDC): hook-up location is subject to Fire Marshal's approval.
6. FDC's shall be 4 inch Storz connections or (2) 2 ½ inch NST connections.
7. FDC access shall comply with IFC 912.3.
8. FDC signage shall be provided and shall comply with IFC 912.4.
9. Fire protection alarm and detection system shall be in compliance with all applicable codes adopted by the City of Ann Arbor, including NFPA 72, 2007 edition and all other referenced standards.
   a. A horn strobe device shall be installed above the FDC and shall activate upon sprinkler water flow.
   b. Emergency responder radio coverage shall comply with 2015 IFC Section 510.
   c. Emergency voice/alarm communications system shall comply with 2015 IFC Section 907.6.2.2.
   d. Occupant notification appliances shall activate throughout the notification zones upon sprinkler water flow.
   e. Place signage on Fire Suppression System Control Room door (IFC 2015 Section 509.1) if applicable.
10. Knox Box emergency access system with keys to access the building, the Fire Suppression System Control Room (if applicable), an elevator key, and any other keys to areas that may be relevant during emergencies will be required. Knox Box with proper keys shall be in place prior to issuance of Certificates of Occupancy for the buildings.
11. The Knox Box shall be mounted no higher than 6 feet from grade in an approved location on the exterior for emergency access to the building as well as access to the Fire Suppression System Control Rooms if applicable.
12. Construction sequencing
    a. Hydrants must be in service and approved during construction.
    b. Hydrants providing protection coverage for the building must be in service and approved by both engineering and fire departments before the fire department will support permit issuance for new construction phase and before combustible materials are placed on the job site.
    c. Storage areas for construction materials must be approved so as not to interfere with fire/emergency site access.
    d. If site access is to be restricted during construction, Knox Box locks for gates are to be provided.
13. No firewalls will be constructed within the building.
14. Booster pumps will be provided on the domestic water service and the fire suppression water service leads. The pumps shall meet 2015 IFC standards, Section 914.3.1.2.
15. No separate Fire Suppression System Control Room is required.

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OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
FIRE PROTECTION PLAN

14

DATE: 5/17/23
SHEET 14 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
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JOB No. 23015

REVISIONS:
PER CITY REVIEW 8/31/23
PER CITY REVIEW 11/10/23

M:\Civil3d_Proj_2023\23015\Site Plan\23015FP1.dwg, 3/25/2024 11:15 AM, Jim Ahnert, 14 FIRE PROTECTION PLAN, MCLLC PDF.pc3
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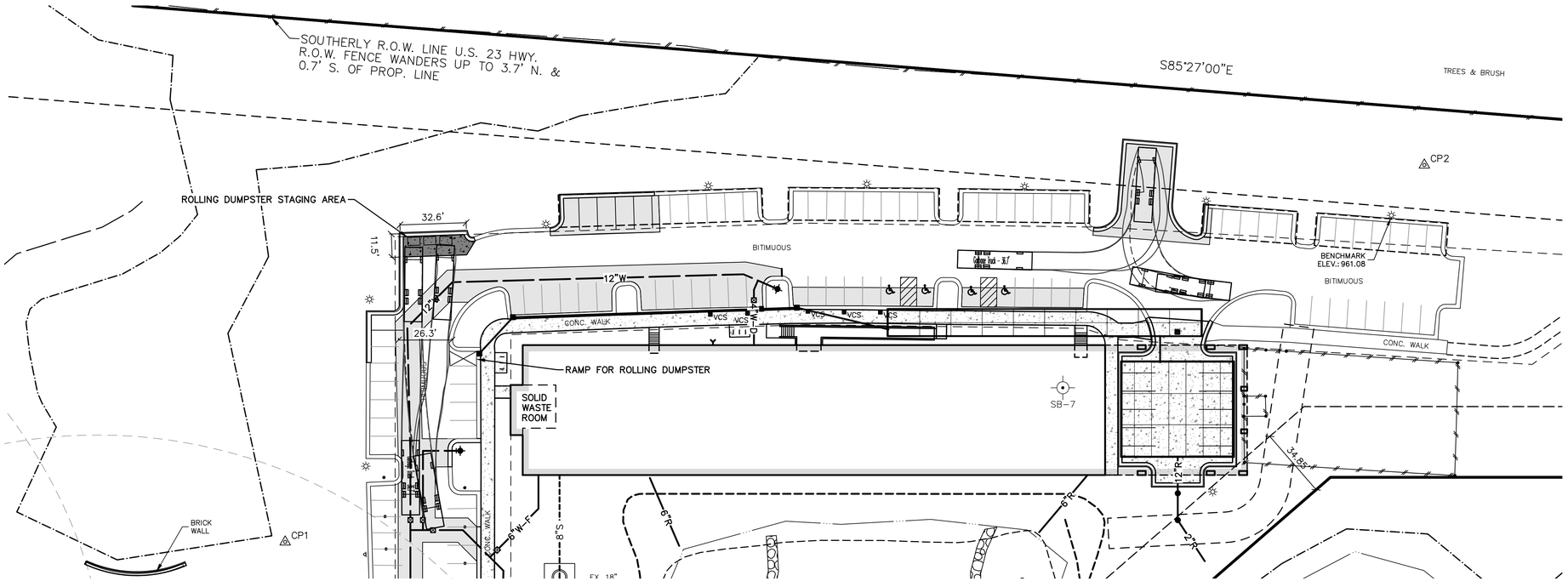
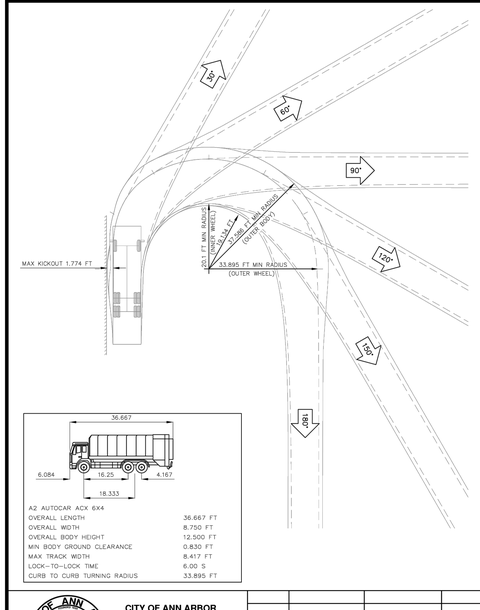


SOLID WASTE PLAN



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PUBLIC SERVICES
301 EAST HURON STREET
P.O. BOX 8647
ANN ARBOR, MI 48107-8647
734-794-6410
www.a2gov.org

REV. NO.	DATE	DRAWN BY	CHECKED BY

SWEPT PATH REQUIREMENTS FOR FRONT LOAD SOLID WASTE VEHICLE

DR. ENG	CH. ENG	DRAWING NO.
SCALE N.T.S.	DATE 10/1/2022	SD-SW-4

1. MAINTAIN A CLEAR SPACE DIRECTLY IN FRONT OF THE SOLID WASTE ENCLOSURE. THE CLEAR SPACE SHALL BE A MINIMUM OF FIFTY (50) FEET LONG BY THE WIDTH OF THE INSIDE DIMENSION (I.D.) OF THE ENCLOSURE WALLS PLUS FOUR (4) FEET ON EACH SIDE. A MINIMUM VERTICAL CLEARANCE OF AT LEAST TWENTY-FIVE (25) FEET MUST BE PROVIDED ABOVE THIS AREA.
2. INGRESS AND EGRESS ROUTES MUST BE DEVELOPED BASED ON SOLID WASTE SWEPT PATH REQUIREMENTS PER SD-SW-4. A MINIMUM HORIZONTAL CLEARANCE OF FOUR (4) FEET FROM THE EDGE OF THE SWEPT PATH AND A MINIMUM VERTICAL CLEARANCE OF AT LEAST FIFTEEN (15) FEET MUST BE PROVIDED ALONG THE ENTIRE SOLID WASTE COLLECTION ROUTE.
3. PROVIDE TEN (10) FEET MINIMUM HORIZONTAL CLEARANCE FROM SOLID WASTE ENCLOSURE TO MAJOR ELECTRICAL EQUIPMENT, ABOVE GROUND UTILITY SERVICES, AND EDGE OF OVERHEAD OBSTRUCTIONS SUCH AS TREE BRANCHES, BALCONIES, AND OVERHANGS.
4. IF FORWARD ACCESS TO THE PUBLIC STREET IS NOT AVAILABLE FOR THE SOLID WASTE VEHICLE, THE SITE DEVELOPMENT LAYOUT MUST ACCOMMODATE A TURN-AROUND LOCATION MEETING REQUIREMENTS WITHIN SOLID WASTE REFERENCE SPECIFIC TURN-AROUND DETAIL (SD-SW-5) AND ACCEPTABLE TO THE PSAA.
5. FOR SITES THAT CANNOT ACCOMMODATE A TURN-AROUND, THE FOLLOWING ADDITIONAL REQUIREMENTS MUST BE MET:
   - 5.1. SOLID WASTE VEHICLES MUST BE ABLE TO SERVICE DUMPSTERS WITHOUT IMPEDING THE PUBLIC STREET OR SIDEWALK.
   - 5.2. THE COLLECTION LOCATION SHALL BE CLEARLY DELINEATED AND NOT HAVE A SLOPE GREATER THAN 2% IN ANY DIRECTION.
   - 5.3. BOLLARDS OR ADEQUATE CLEAR SPACE MUST BE PROVIDED BEHIND THE LIFT POINT SO THE DUMPSTERS ARE NOT PUSHED INTO ANY BUILDING OR ACCESS ROUTE.
   - 5.4. ALL SWEPT-PATH CLEARANCE AND VERTICAL CLEARANCE REQUIREMENTS PREVIOUSLY IDENTIFIED SHALL BE PROVIDED.
   - 5.5. SOLID WASTE VEHICLE BACK-UP DISTANCES MUST BE LESS THAN 30' ALONG SERVICING ROUTE.
6. GATES ON BIN ENCLOSURES SHALL OPEN A MINIMUM OF 120 DEGREES FROM THE CLOSED POSITION. THE GATES SHALL NOT IMPEDE ON THE REQUIRED BIN ENCLOSURE OPENING WIDTH, SHALL NOT BLOCK ADJACENT PARKING SPOTS, AND NOT BE IMPEDED BY ADJACENT CURBS OR LANDSCAPING.
7. GATES SHALL BE DESIGNED TO BE FREE STANDING WITHOUT CENTER POLE DESIGN. IF CENTER POLE DESIGN IS NECESSARY, 12 INCHES SHALL BE ADDED TO THE MINIMUM INTERIOR WIDTH OF THE ENCLOSURE.
8. GATE DESIGN SHALL INCLUDE A RELIABLE MEANS TO SECURE THE DOOR IN BOTH THE OPEN AND CLOSED POSITIONS.

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PUBLIC SERVICES
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ANN ARBOR, MI 48107-8647
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REV. NO.	DATE	DRAWN BY	CHECKED BY

SOLID WASTE GENERAL NOTES

DR. ENG	CH. ENG	DRAWING NO.
SCALE N.T.S.	DATE 10/1/2022	SD-SW-6A

9. THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF NO PARKING SIGNS ALONG THE SOLID WASTE INGRESS/EGRESS ROUTE TO ENSURE THE ROUTE REMAINS FREE OF VEHICLES.
10. REFER TO ASSOCIATED STANDARD DETAILS SD-SW-1 AND SD-SW-2 FOR REQUIREMENTS ON SINGLE AND DOUBLE WIDE SOLID WASTE BIN ENCLOSURE LAYOUT AND DESIGN CRITERIA. THE CITY SHALL HAVE THE ABILITY TO MODIFY OR INTERPRET THESE DETAILS AS NECESSARY TO ACCOMMODATE THE CITY OR CITY CONTRACTOR'S NEEDS FOR SOLID WASTE PICK-UP.
11. SOLID WASTE EQUIPMENT ACCESS ROADS AND SERVICE AREA SURFACES SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF COLLECTION VEHICLES WEIGHING UP TO 66,000 LBS GROSS VEHICLE WEIGHT (GVW) AND SHALL BE PROVIDED WITH AN APPROVED SURFACE SO AS TO PROVIDE ALL WEATHER DRIVING CAPABILITIES. PROPERTY OWNER SHALL BE RESPONSIBLE FOR ALL SNOW AND ICE REMOVAL REQUIRED FOR SAFE ACCESS.
12. FOR SITES THAT CANNOT ACCOMMODATE A STANDARD DUMPSTER ENCLOSURE, THE DUMPSTERS MAY BE ROLLED OUT OF A BUILDING OR ALTERNATE ENCLOSURE BY THE PROPERTY OWNER TO AN APPROVED COLLECTION LOCATION.
13. SOLID WASTE COLLECTION LOCATIONS MUST BE LOCATED WITHIN THE BOUNDARIES OF THE PROPERTY UNLESS AN APPROPRIATE EASEMENT IS OBTAINED.

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SCALE N.T.S.	DATE 10/1/2022	SD-SW-6B

Owl Creek Phase 2 Solid Waste Calculations

There will be a trash room on the first floor of the building with trash chutes on each floor. The trash will utilize a compactor for both trash and recyclables. The solid waste will be collected in 3 cy rolling dumpsters and be placed out on collection day.

	Studio	1 BR	2 BR
1st Floor	5	15	2
2nd Floor	6	19	4
3rd Floor	6	19	4
4th Floor	6	19	4
5th Floor	7	16	1
Total	30	88	15

Studio = 1 Person
1 Bedroom = 2 People
2 Bedroom = 4 People

Total Population 266 People

Assumptions: 4.5 lbs of solid waste per person per day
225 lbs per cubic yard solid waste
0.020 cy/person/day
0.140 cy/person/week
Compactor will provide a 4:1 compaction ratio
0.035 cy/person/week compacted solid waste

Total solid waste volume generated per week will be:
9.31 Cy compacted solid waste

Using 3 Cy rolling dumpsters the new building will require 3-4 dumpsters per week. The rolling dumpsters will be placed out by building staff on pickup day and carts will be moved back in the building's trash room an hour after pickup time. One pickup per week is anticipated.

SCALE: 1" = 30'
0 30 60 90

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The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

M:\Civil3d_Proj_2023\23015\Site Plan\23015SW1.dwg, 3/25/2024 11:15 AM, Jim Ahnert, 15 SOLID WASTE PLAN, MCLG PDF.pc3
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OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
SOLID WASTE PLAN

15

DATE: 5/17/23
SHEET 15 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015SW1

JOB No. 23015

REVISIONS:	REV. DATE
PER CITY REVIEW	1/19/23
PER CITY REVIEW	5/17/23

M:\Civil\3d_Pro_2023\23015\Site Plan\23015SM1.dwg, 3/25/2024 11:15 AM, Jim Ahnert, 16 STORM WATER MANAGEMENT PLAN, MCLLC PDF.pc3

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Owl Creek Phase 2

Storm Water Narrative

The first phase of the Owl Creek project, previously known as The Annex, was approved by the City in 2016 and constructed in 2018-2019. The site has two detention basins. The south basin provides detention for the majority of the site, almost 9 acres while the north basin provides detention for the north driveway and parking areas, roughly 4 acres. The detention basins were sized using the previous WCWRC requirements.

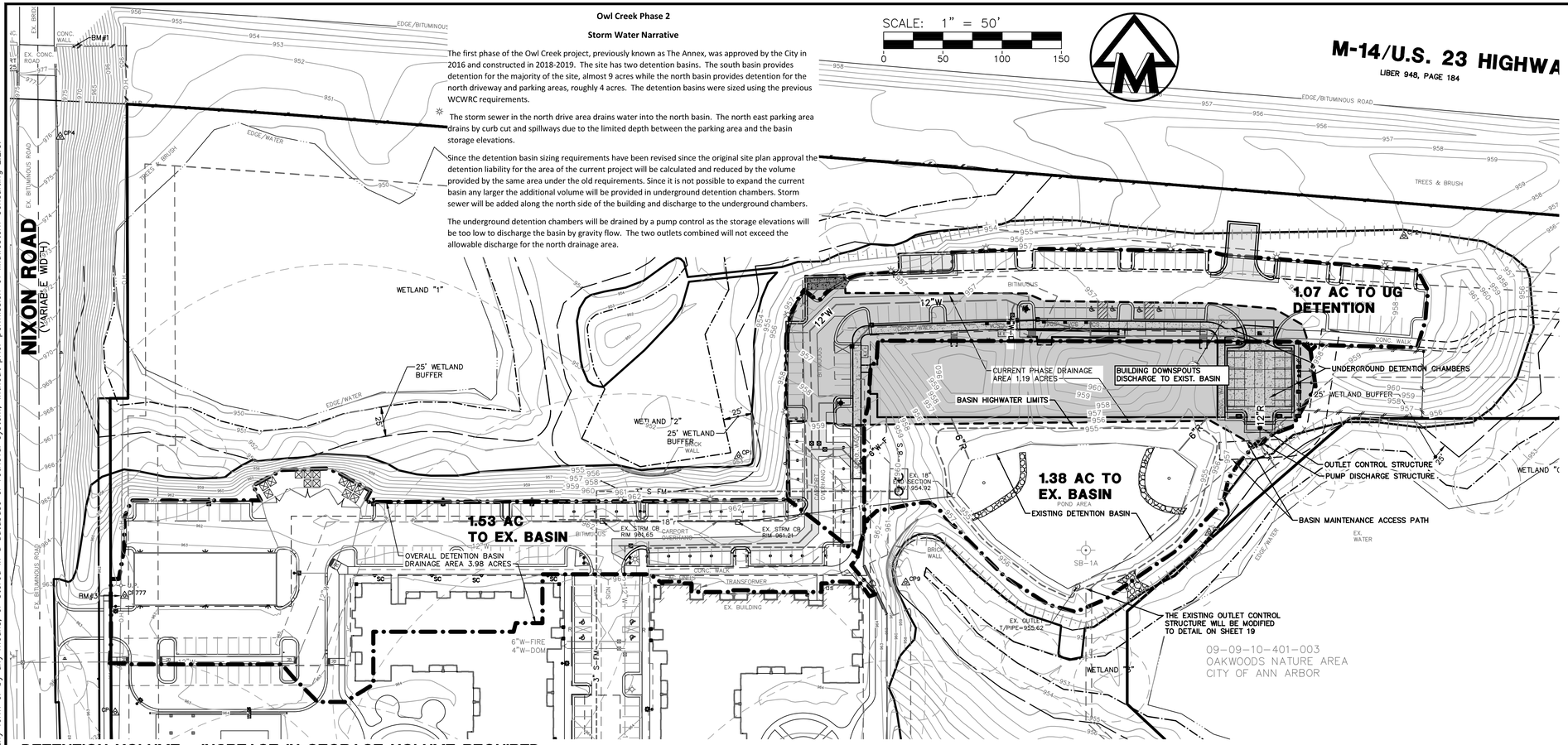
The storm sewer in the north drive area drains water into the north basin. The north east parking area drains by curb cut and spillways due to the limited depth between the parking area and the basin storage elevations.

Since the detention basin sizing requirements have been revised since the original site plan approval the detention liability for the area of the current project will be calculated and reduced by the volume provided by the same area under the old requirements. Since it is not possible to expand the current basin any larger the additional volume will be provided in underground detention chambers. Storm sewer will be added along the north side of the building and discharge to the underground chambers.

The underground detention chambers will be drained by a pump control as the storage elevations will be too low to discharge the basin by gravity flow. The two outlets combined will not exceed the allowable discharge for the north drainage area.

SCALE: 1" = 50'

0 50 100 150



LEGEND

838	EXIST. CONTOUR
838	PROP. CONTOUR
36.60	EXIST. SPOT ELEVATION
36.60	PROP. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
	EXIST. AC UNIT
	EXIST. GENERATOR
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
	PROP. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
g	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
	REDUCER
fdc	EXIST. FIRE DEPARTMENT CONNECTION
FDC	PROP. FIRE DEPARTMENT CONNECTION
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
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	PROP. BEEHIVE INLET
RD	PROP. ROOF DRAIN
	END SECTION
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	SIGN
	SINGLE TREE
	TREE OR BRUSH LIMIT

DETENTION VOLUME - INCREASE IN STORAGE VOLUME REQUIRED

Basin Stormwater Calculations - North Detention Basin Modifications - Increase in Volume Required

Based on Current Phase Building Addition and Parking Compared to Previously Approved Siteplan

Required Volume Calculations for current phase and disturbed area

W1 - Determining Post-Development Cover Types, Areas, Curve Numbers, and Runoff Coefficients

Rational Method Variables

Cover Type	Soil Type	Area (sft)	Area (ac)	Runoff Coeff. (C)	(C) x (Area)
Building		22,926	0.53	0.95	0.50
Pavement		16,720	0.38	0.95	0.36
Grass	A		0.00	0.15	0.00
Grass	B		0.00	0.25	0.00
Grass	C		0.00	0.30	0.00
Grass	D	11,974	0.27	0.45	0.12
Water Surface			0.00	1.00	0.00
Total		51,620	1.19		0.99
		Weighted C = (Sum(C)x(Area))/(Area Total)=			0.83

NRCS Variables (Pervious)

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) x (Area)
Grass	A	0	0.00	49	0.00
Grass	B	0	0.00	69	0.00
Grass	C	0	0.00	79	0.00
Grass	D	11,974	0.27	84	0.23
Total		11,974	0.27		0.23
		Weighted CN = (Sum(CN)x(Area))/(Area Total)=			84

NCRS Variables (Impervious)

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) x (Area)
Building		22,926	0.53	98	0.52
Pavement		16,720	0.38	98	0.38
Water Surface		0	0.00	98	0.00
Total		39,646	0.91		0.89
		Weighted CN = (Sum(CN)x(Area))/(Area Total)=			98

W2 - W2 - First Flush Runoff Calculations (Vrf)

A. Vrf = 1" x 1'/12" x 43560 sf/ac x A x C where A= 1.19 and where C= 0.83

Vrf = 1" x 1'/12" x 43560 sf/ac x 1.19 x 0.83 = 3,570 cf

W3 - W3 - Pre-Development Bankfull Runoff Calculations (Vbf-pre)

A. 2 year / 24 hour storm event: P= 2.35 in
B. Pre-Development CN (Good Cover Woods, Type D Soils) CN= 79
C. S = (1000 / CN) - 10 S= 2.658 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 0.739 in
E. Total Site Area excluding "Self-Crediting" BMPs 51,620 sft
F. Vbf-pre = Q x (1/12) x Area Vbf-pre = 3,177 cft

W4 - Pervious Cover Post-Development Bankfull Runoff Calculations (Vbf-per-post)

A. 2 year / 24 hour storm event: P= 2.35 in
B. Pervious Cover CN From Worksheet 1 CN= 84
C. S = (1000 / CN) - 10 S= 1.905 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 1.001 in
E. Pervious Cover Area from Worksheet 1 11,974 sft
F. Vbf-per-post = Q x (1/12) x Area Vbf-per-post = 999 cft

W5 - W5 - Impervious Cover Post-Development Bankfull Runoff Calculations (Vbf-imp-post)

A. 2 year / 24 hour storm event: P= 2.35 in
B. Impervious Cover CN From Worksheet 1 CN= 98
C. S = (1000 / CN) - 10 S= 0.204 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 2.122 in
E. Impervious Cover Area from Worksheet 1 39,646 sft
F. Vbf-imp-post = Q x (1/12) x Area Vbf-imp-post = 7,010 cft

W6 - W6 - Pervious Cover Post-Development 100-Year Runoff Calculations (V100-per-post)

A. 100 year / 24 hour storm event: P= 5.11 in
B. Pervious Cover CN From Worksheet 1 CN= 84
C. S = (1000 / CN) - 10 S= 1.905 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 3.371 in
E. Pervious Cover Area from Worksheet 1 11,974 sft
F. V100-per-post = Q x (1/12) x Area V100-per-post = 3,364 cft

W7 - W7 - Impervious Cover Post-Development 100-Year Runoff Calculations (V100-imp-post)

A. 2 year / 24 hour storm event: P= 5.11 in
B. Impervious Cover CN From Worksheet 1 CN= 98
C. S = (1000 / CN) - 10 S= 0.204 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 4.873 in
E. Impervious Cover Area from Worksheet 1 39,646 sft
F. Vbf-imp-post = Q x (1/12) x Area Vbf-imp-post = 16,100 cft

W8 - Time of Concentration (Tc-hrs)

A. Assume 15-minute minimum time of concentration Tc= 0.25 hr

W9 - Runoff Summary & On-Site Infiltration Requirement

A. Summary from Previous Worksheets
- **First Flush Volume (Vff) 3,570 cft**
- **Pre-Development Bankfull Runoff Volume (Vbf-pre) 3,177 cft**
- *Pervious Cover Post-Development Bankfull Volume (Vbf-per-post) 999 cft*
- *Impervious Cover Post-Development Bankfull Volume (Vbf-imp-post) 7,010 cft*
- **Total BF Volume (Vbf-p-post) 8,008 cft**
- *Pervious Cover Post-Development 100-Year Volume (V100-per-post) 3,364 cft*
- *Impervious Cover Post-Development 100-Year Volume (V100-imp-post) 16,100 cft*
- **Total 100-Year Volume (V100) 19,463 cft**

B. Determine Onsite Infiltration Requirement
Subtract the Pre-Development Bankfull from the Post-Development Bankfull Volume
- Total Post-Development Bankfull Volume (Vbf-post) 8,008 cft
- Pre-Development Bankfull Runoff Volume (Vbf-pre) 3,177 cft
- **Bankfull Volume Difference 4,831 cft**
- **Infiltration Requirement (Vinf) 4,831 cft**

W10 - Detention/Retention Requirement

A. $Q_P = 238.6\ Tc^{-0.82}$ 743.63 cfs/(in x sq. mi)
B. Total Site Area excluding "Self-Crediting" BMPs 1.19 ac
C. $Q_{100} = Q_{100\text{-per}} + Q_{100\text{-imp}}$ (from W6 and W7, respectively) 8.244 in
D. Peak Flow (PF) = Q_P x Q_{100} x Area / 640 11.35 cfs
E. Delta = PF - 0.15 x Area (ac) 11.17 cfs
[0.15 x Area (ac)] *0.18 cfs*
F. V100 = Delta / PF x V100 19,159 cft
Required Detention not including infiltration credit or penalty.
Sediment Forebay Volume Required (5% of V100) 973 cft

W11 - Determine Applicable BMPs and Associated Volume Credits

Previous soil boring in the project area indicate the site soils are clay with little opportunity for infiltration. Based on the soils, no infiltration will be incorporated in to the propose design.

		Storage Volume (cft)		Design Infilt. Rate	Infilt. Volume in 6-hr	Total Volume
Proposed BMP	Area (sft)	Surface	In Soil	(in/hr)	Drawdown (cft)	Reduction (cft)
Bioretention Systems					0	0
Rain Gardens					0	0
Bioswale					0	0

Total Volume Reduction Credit by Proposed Structural BMPs (cft) 0
Runoff Volume Infiltration Requirement (Vinf) from W9 (cft) 4,831
Runoff Volume Credit (cft) 0

W13 - Site Summary of Infiltration & Detention

A. Stormwater Management Summary

Min Infiltration Requirement (Vinf)	4,831 cft
Designed/Provided Infiltration Volume	0 cft
% Minimum Required Infiltration Provided	0 %
Total Calculated Detention Volume, Vdet	19,159 cft
Net Required Detention Volume	19,159 cft
(Vdet - Designed/Provided Infiltration Volume)	

B. Detention Volume Increase for sites where the required infiltration volume cannot be achieved.

% Required Infiltration NOT Provided	100.0 %
(100% - % Minimum Required Infiltration Provided)	
Net % Penalty (20% x % Required Infiltration NOT Provided)	20.0 %
Total Required Detention Volume, including penalty	**22,990 cft**
[(100% + Net % Penalty) x Net Required Detention Volume)]	

The previously approved site plan accounted for this area to drain to the north detention basin and accounted for the impervious surface of the parking area. The previous site plan used the old rules of the WCWRC to compute required detention volumes. This new work area is required to design to the current WCWRC rules for the area of the project. The proposed plan calculates the difference in detention storage required by this work area combined with the remaining drainage area computed under the old rules.

Detention Required for current project site area (1.19 Ac.) under old WCWRC rules

First Flush	1,183 cf	
Bankfull	5,325 cf	
100 Year	8,166 cf	

Total Detention Required for current site plan project area (1.19 AC.)

First Flush	3,570 cf	
Bankfull	8,008 cf	
100 Year	19,159 cf	
100 Year	22,990 cf	Incl 20% penalty

Difference in detention requirement between previous site plan and current plan

First Flush	2,387 cf	
Bankfull	2,683 cf	
100 Year	14,824 cf	Incl 20% penalty

Detention Volume for enitre drainage area (3.98 Ac.) from previous site plan

First Flush	5,073 cf	
Bankfull	22,835 cf	
100 Year	36,220 cf	

New Detention Volume requirement for enitre drainage area (3.98 Ac.)

First Flush	7,460 cf	
Bankfull	25,518 cf	
100 Year	51,044 cf	

As-built Detention Volume for existing basin

First Flush	8,796 cf	
Bankfull	28,231 cf	
100 Year	43,913 cf	

New Detention Volume storage required

First Flush	0 cf	
Bankfull	0 cf	
100 Year	7,131 cf	

STORM WATER
DETENTION POND CALCULATIONS
Project: Owl Creek-Existing Site Volume
Midwestern Consulting Project No. 12088

Pond #1 - Main pond

These calculations are to verify the existing outlet control structure will still operate adequately with the proposed additional runoff volume contributing to the basin

I. Common Items and Assumptions:

A. First Flush = (0.5"/12) x 43,560 x area x developed C
B. Bankfull Flood = 8,170 x area x developed C
C. Detention Volume Equation

$V = (A_t + A_b + (A_t \times A_b)^{*}0.5) (H/3)$

where, A_t = Area at top of storage elevation
A_b = Area at bottom of storage elevation
H = Depth of analysis

II. Detention Pond Volumes:

A. First Flush, Bankfull Flood and 100-year Storm Event
1. Contributing Area = 1.19 Ac.
2. Developed Runoff Coefficient:

	Area (A), Ac.	Coefficient (C)	A x C
Rooftop / Asphalt Area	0.45	0.95	0.43
Lawn/Landscaped Area	0.73	0.30	0.22
Totals:	1.19		0.65

Developed C = 0.65 / 1.19 = 0.55

3. First Flush Volume:
V= (0.5"/12) x 43,560 x 0.55 x 1.19 = 1183 CF
4. Bankfull Flood Volume:
V= 8,170 x 0.55 x 1.19 = 5325 CF
5. 100-Year Flood Volume:
Q_A = 0.15 x 1.19 = 0.18 CFS
Q_D = 0.1778 /(1.19 x 0.55) = 0.27 CFS/Ac-Imp.
T = -25 + (10,312.50 / 0.27)^0.5 = 169.45 min.
V_S = ((16,500 x 169.45) / (169.45 +25))-(40 x 0.27 x 169.45) = 12530 CF/Ac-Imp.
V_T = 12530 x 1.19 x 0.55 = 8166.5 CF

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OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
STORM WATER MANAGEMENT PLAN

16

JOB No. 23015

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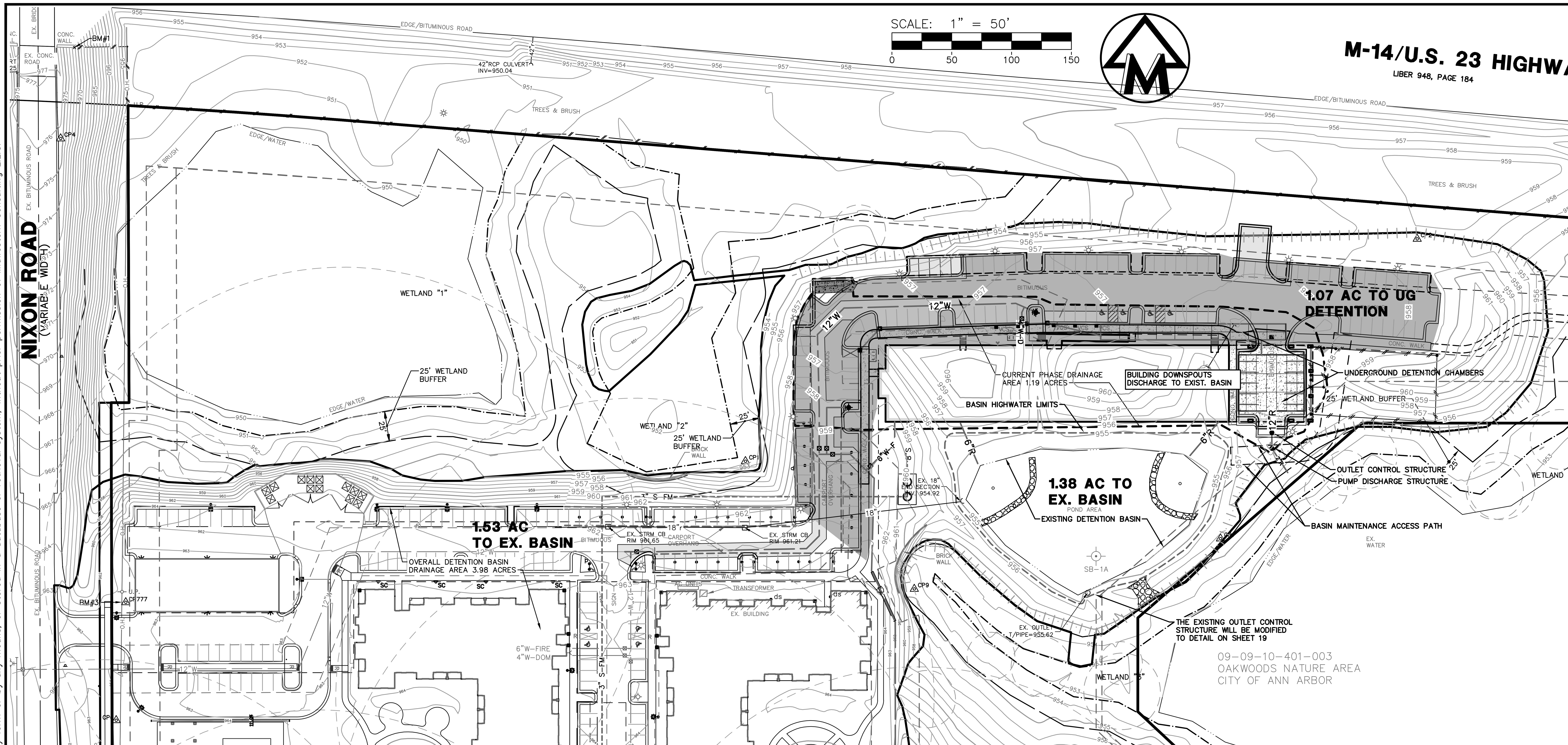
/23015SM1

REVISIONS:	REV. DATE
PER CITY REVIEW	6/19/23
PER CITY REVIEW	9/7/23
PER WCWRC REVIEW	12/21/23



LEGEND

838	EXIST. CONTOUR
838	PROP. CONTOUR
	EXIST. SPOT ELEVATION
36.60	PROP. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
	EXIST. AC UNIT
	EXIST. GENERATOR
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
	PROP. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
g	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
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	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
	REDUCER
fdc	EXIST. FIRE DEPARTMENT CONNECTION
FDC	PROP. FIRE DEPARTMENT CONNECTION
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	EXIST. BEEHIVE INLET
	PROP. BEEHIVE INLET
RD	PROP. ROOF DRAIN
	END SECTION
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
	SIGN
	SINGLE TREE
	TREE OR BRUSH LIMIT

811 Know what's below. Call before you dig.

DETENTION VOLUME - INCREASE IN STORAGE VOLUME PROVIDED IN NEW UNDERGROUND SYSTEM

New Underground Detention System Stormwater Calculations

W1 - Determining Post-Development Cover Types, Areas, Curve Numbers, and Runoff Coefficients

Rational Method Variables

Cover Type	Soil Type	Area (sft)	Area (ac)	Runoff Coeff. (C)	(C) x (Area)
Building/Pavement			0.00	0.95	0.00
Pavement		39,400	0.90	0.95	0.86
Grass	A		0.00	0.15	0.00
Grass	B		0.00	0.25	0.00
Grass	C		0.00	0.30	0.00
Grass	D	7,200	0.17	0.45	0.07
Water Surface			0.00	1.00	0.00
Total		46,600	1.07		0.93

Weighted C = (Sum(C)x(Area))/(Area Total)= 0.87

NRCS Variables (Pervious)

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) x (Area)
Grass	A	0	0.00	49	0.00
Grass	B	0	0.00	69	0.00
Grass	C	0	0.00	79	0.00
Grass	D	7,200	0.17	84	0.14
Total		7,200	0.17		0.14

Weighted CN = (Sum(CN)x(Area))/(Area Total)= 84

NCRS Variables (Impervious)

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) x (Area)
Building/Pavement		0	0.00	98	0.00
Pavement		39,400	0.90	98	0.89
Water Surface		0	0.00	98	0.00
Total		39,400	0.90		0.89

Weighted CN = (Sum(CN)x(Area))/(Area Total)= 98

W2 - W2 - First Flush Runoff Calculations (V_{ff})

A. V_{ff} = 1" x 1'/12" x 43560 sft/ac x A x C where A= 1.07 and where C= 0.87

V_{ff} = 1" x 1'/12" x 43560 sft/ac x 1.07 x 0.87 = 3,379 cf

W3 - W3 - Pre-Development Bankfull Runoff Calculations ($V_{bf\text{-}pre}$)

A. 2 year / 24 hour storm event: P= 2.35 in
B. Pre-Development CN (Good Cover Woods, Type D Soils) CN= 79
C. S = (1000 / CN) - 10 S= 2.658 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 0.739 in
E. Total Site Area excluding "Self-Crediting" BMPs 46,600 sft
F. $V_{bf\text{-}pre}$ = Q x (1/12) x Area $V_{bf\text{-}pre}$ = 2,868 cft

W4 - Pervious Cover Post-Development Bankfull Runoff Calculations ($V_{bf\text{-}per\text{-}post}$)

A. 2 year / 24 hour storm event: P= 2.35 in
B. Pervious Cover CN From Worksheet 1 CN= 84
C. S = (1000 / CN) - 10 S= 1.905 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 1.001 in
E. Pervious Cover Area from Worksheet 1 7,200 sft
F. $V_{bf\text{-}per\text{-}post}$ = Q x (1/12) x Area $V_{bf\text{-}per\text{-}post}$ = 601 cft

W5 - W5 - Impervious Cover Post-Development Bankfull Runoff Calculations ($V_{bf\text{-}imp\text{-}post}$)

A. 2 year / 24 hour storm event: P= 2.35 in
B. Impervious Cover CN From Worksheet 1 CN= 98
C. S = (1000 / CN) - 10 S= 0.204 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 2.122 in
E. Impervious Cover Area from Worksheet 1 39,400 sft
F. $V_{bf\text{-}imp\text{-}post}$ = Q x (1/12) x Area $V_{bf\text{-}imp\text{-}post}$ = 6,966 cft

W6 - W6 - Pervious Cover Post-Development 100-Year Runoff Calculations ($V_{100\text{-}per\text{-}post}$)

A. 100 year / 24 hour storm event: P= 5.11 in
B. Pervious Cover CN From Worksheet 1 CN= 84
C. S = (1000 / CN) - 10 S= 1.905 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 3.371 in
E. Pervious Cover Area from Worksheet 1 7,200 sft
F. $V_{100\text{-}per\text{-}post}$ = Q x (1/12) x Area $V_{100\text{-}per\text{-}post}$ = 2,023 cft

W7 - W7 - Impervious Cover Post-Development 100-Year Runoff Calculations ($V_{100\text{-}imp\text{-}post}$)

A. 2 year / 24 hour storm event: P= 5.11 in
B. Impervious Cover CN From Worksheet 1 CN= 98
C. S = (1000 / CN) - 10 S= 0.204 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 4.873 in
E. Impervious Cover Area from Worksheet 1 39,400 sft
F. $V_{bf\text{-}imp\text{-}post}$ = Q x (1/12) x Area $V_{bf\text{-}imp\text{-}post}$ = 16,000 cft

W8 - Time of Concentration (Tc-hrs)

A. Assume 15-minute minimum time of concentration Tc= 0.25 hr

W9 - Runoff Summary & On-Site Infiltration Requirement

A. Summary from Previous Worksheets

First Flush Volume (Vff) **3,379 cft**
Pre-Development Bankfull Runoff Volume (Vbf-pre) **2,868 cft**
Pervious Cover Post-Development Bankfull Volume (Vbf-per-post) *601 cft*
Impervious Cover Post-Development Bankfull Volume (Vbf-imp-post) *6,966 cft*
Total BF Volume (Vbf-post) **7,567 cft**
Pervious Cover Post-Development 100-Year Volume (V100-per-post) *2,023 cft*
Impervious Cover Post-Development 100-Year Volume (V100-imp-post) *16,000 cft*
Total 100-Year Volume (V100) **18,022 cft**

B. Determine Onsite Infiltration Requirement

Subtract the Pre-Development Bankfull from the Post-Development Bankfull Volume
Total Post-Development Bankfull Volume (Vbf-post) 7,567 cft
Pre-Development Bankfull Runoff Volume (Vbf-pre) 2,868 cft
Bankfull Volume Difference **4,698 cft**
Infiltration Requirement (Vinf) **4,698 cft**

W10 - Detention/Retention Requirement

A. Q_p = 238.6 Tc^-0.82 743.63 cfs/(in x sq. mi)
B. Total Site Area excluding "Self-Crediting" BMPs 1.07 ac
C. $Q_{100} = Q_{100\text{-}per} + Q_{100\text{-}imp}$ 8.244 in
(from W6 and W7, respectively)
D. Peak Flow (PF) = Q_p x Q_{100} x Area / 640 10.25 cfs
E. Delta = PF - 0.15 x Area (ac) 10.09 cfs
[0.15 x Area (ac)] *0.16 cfs*
F. V_{det} = Delta / PF x V_{100} 17,740 cft
Required Detention not including infiltration credit or penalty.
Sediment Forebay Volume Required (5% of V100) 901 cft

Retention

A. Vret = 2 x V_{100} 36,045 cft

W11 - Determine Applicable BMPs and Associated Volume Credits

Previous soil boring in the project area indicate the site soils are clay with little opportunity for infiltration. Based on the soils, no infiltration will be incorporated in to the propose design.

Proposed BMP	Area (sft)	Storage Volume (cft) Surface	Storage Volume (cft) In Soil	Design Infilt. Rate (in/hr)	Infilt. Volume in 6-hr Drawdown (cft)	Total Volume Reduction (cft)
Bioretention Systems					0	0
Rain Gardens					0	0
Dry Well					0	0
Bioswale					0	0

Total Volume Reduction Credit by Proposed Structural BMPs (cft) 0
Runoff Volume Infiltration Requirement (Vinf) from W9 (cft) 4,698
Runoff Volume Credit (cft) 0

W13 - Site Summary of Infiltration & Detention

A. Stormwater Management Summary

Min Infiltration Requirement (V_{inf}) 4,698 cft
Designed/Provided Infiltration Volume 0 cft
% Minimum Required Infiltration Provided 0 %
Total Calculated Detention Volume, V_{det} 17,740 cft
Net Required Detention Volume 17,740 cft
(V_{det} - Designed/Provided Infiltration Volume)

B. Detention Volume Increase for sites where the required infiltration volume cannot be achieved.

% Required Infiltration NOT Provided 100.0 %
(100% - % Minimum Required Infiltration Provided)
Net % Penalty (20% x % Required Infiltration NOT Provided) 20.0 %
Total Required Detention Volume, including penalty **21,288 cft**
[(100% + Net % Penalty) x Net Required Detention Volume)]

Detention Outlet Calculcations

A. Required Detention Volumes (Reduced by 6-hour infiltration)

Storm Event	Req'd Volume	less	Infil. Credit	=	Final Volume
First Flush	3,379 cft	-	0 cft	=	**3,379** cft
Bankfull	7,567 cft	-	0 cft	=	**7,567** cft
100 -year	17,740 cft	-	0 cft	=	**17,740** cft
100-year + Req'd Penalty	21,288 cft	-	0 cft	=	**21,288** cft
Forebay Volume Required (5% of 100-yr)				=	**887** cft

B. Detention Volumes Provided

StormTrap footprint of 4680 sf yields a net area of 87 % w/structure 4072 sft

Elevation	Area (sft)	Depth (ft)	Volume (cft)	Cum. Volume (cft)
948.0	4,072	0	0	0
949.0	4,072	1	4,072	4,072
950.0	4,072	1	4,072	8,143
951.0	4,072	1	4,072	12,215
952.0	4,072	1	4,072	16,286
953.0	4,072	1	4,072	20,358
953.5	4,072	1	2,036	22,394
			Total Volume =	22,394

Storage Elevation Calculation

First Flush Elevation (Xff)= (949.0 - 948.0) / (4,072 - 0) = (Xff - 948.0) / (3,379 - 0) Xff = 948.83 ft

Bankfull Elevation (Xbf)= (950.0 - 949.0) / (8,143 - 4,072) = (Xbf - 949.0) / (7,567 - 4,072) Xbf = 949.86 ft

100-Year Elevation (X100)= (953.5 - 953.0) / (22,394 - 20,358) = (X100 - 953.0) / (21,288 - 20,358) X100 = 953.23 ft

C. Two-Stage Outlet Design

First Flush Discharge (24-36 hours for the detention of first flush storm event)

Average Head (H_{ave}) = 2/3 (X_{ff} - X_{bot}) = 2/3 (948.83 - 948) = 0.55 ft
First Flush Max. Flowrate ($Q_{ff\text{-}max}$) = V_{ff} / 24 hrs = 3379cfs / (24 hrs*3600) = 0.04 cfs
Req Area (A_{ff}) = $Q_{ff\text{-}max}$ / 0.62 / sqrt(2*g*H_{ave}) = 0.04/0.62/(2*32.2*0.55)^0.5= 0.011 sft
Orifice Diameter, Proposed 0.750 in
Orifice Area = 0.0031 sft
Number Required for 24 hr drainage = A_{ff} / Orifice Area= 0.011 sft / 0.0031 sft = 3.53 holes
Number of Holes to Use 3 holes
Area of (3) - 0.75 inch Orific A_{ff} 0.0092 sft
Actual Flow (Q_{ff}) = 0.62 * A_{ff} * sqrt(2*g*H_{ave}) = 0.62 * 0.0092 *sqrt(2*32.2*0.55) = 0.034 cfs
Actual Time (T_{ff}) = V_{ff} / Q_{ff} = 3379 cf / 0.034 cfs / 3600 = 27.65 hr

Bankfull Discharge (36-48 hours)

Average Head (H_{ave}) = 2/3 (Xbf - Xbot) = 2/3 (949.86 - 948) = 1.24 ft
Actual Flow (Q_{bf}) = 0.62 * Aff * sqrt(2*g*Have) = 0.62 * 0.0092 * sqrt(2 * 32.2 * 1.24)= 0.051 cfs
Actual Time (T_{bf}) = Vbf / Qbf = 7567 cf / 0.051 cfs / 3600 = 41.24 hr
Drawdown Time for Bankfull Volume is between 36 and 48 hours

100-year Discharge (0.15 cfs/acre max. allowed)

Max Head to Lowest Holes (Hmax100-ff) = X_{100} - X_{bot}= 953.23 - 948 = 5.23 ft
Max Flow at Lowest Holes ($Q_{max\text{-}ff}$)= 0.62 * A_{ff} * sqrt(2 * g * H_{max}) =
= 0.62 * 0.0092 * sqrt(2 * 32.2 * 5.23) = 0.105 cfs
Max Head to 100yr Holes ($H_{max\text{-}100}$) = X_{100} - X_{bf} = 953.23 - 949.86 = 3.37 ft
Q_A (Allowable 100-year release rate)= 0.15 cfs/acre = 0.15 cfs * 1.07 ac = 0.160 cfs
Max flow through 100-year holes = $Q_{max\text{-}100}$ = Q_A - $Q_{max\text{-}ff}$ = 0.16 cfs - 0.1 cfs = 0.06 cfs
Max. Area for Orifices (A_{100}) = Q_{max} / 0.62 / sqrt (2*g*h-100max) 0.01 sft
Orifice Diameter 1.000 in
Orifice Area 0.005 sft
Number Required for 0.15 cfs/acre drainage 1.12
Number of holes used 1 ea
Area of (1) - 1 inch Orifice (A_{100}) 0.005 sft
100-year orifices - Actual Flow ($Q_{max\text{-}100}$) = 0.62 * A_{100} * sqrt (2 * g * H_{max100})
= 0.62 * 0.005 * sqrt (2 * 32.2 * 3.37) = 0.050 cfs
Actual Max Release Rate (Qmax) = Qmax-100 + Qmax-ff = 0.05 cfs + 0.105 cfs = 0.15 cfs

100-year Drawdown Time (72-hour max. to the lowest orifice)

Average head to first flush holes with all orifice in use ($H_{ff\text{-}ave}$) = 2/3 (X_{100} - X_{bf}) + (X_{bf} - X_{bot})
$H_{ff\text{-}ave}$ = 2/3 (953.23 - 949.86) + (949.86 -948) = 4.11 ft
Average flow through lowest holes to bankfull elevation = 0.62 * A_{ff} * sqrt (2 * g * $H_{ff\text{-}ave}$)
$Q_{ff\text{-}ave}$ = 0.62 * 0.0092 * SQRT(2 * 32.2 * 4.11) 0.093 cfs
Average head to 100-year holes with all orifices in use = 2/3 (X_{100}-X_{bf})
$H_{100\text{-}ave}$ = 2/3 * (953.23 - 949.86) = 2.25 ft
Average flow through 100-yr holes with all holes in use = 0.62 * A_{100} * sqrt (2 * g * $H_{100\text{-}ave}$)
$Q_{100\text{-}ave}$ = 0.62 * 0.005 * sqrt(2 * 32.2 * 2.25) = 0.037 cfs
Combined drawdown flow ($Q_{100\text{-}bf}$) = $Q_{ff\text{-}ave}$ + $Q_{100\text{-}ave}$ = 0.093 cfs + 0.037 cfs = 0.130 cfs
Volume of Storage above Bankfull Elev (V_{rem}) = V_{100} - V_{bf} = 21288 - 7567 = 13,721 cft
Time to drain Volume between 100yr and bankfull elevations = V_{rem}/$Q_{100\text{-}bf}$/3600
= 13721 cf / 0.13 cfs / 3600 = 29.29 hr
Total 100-year drawdown time = T100 = T100-bf + Tbf = 41.24 hrs + 29.29 hrs = 70.53 hr
Therefore use (1) 1 inch Diameter Holes at Elev 949.86

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OWL CREEK PHASE 2
SITE PLAN FOR CITY COUNCIL AND REZONING
PROP. DETENTION

17

JOB No. 23015	DATE:
REVISIONS: REV. DATE	SHEET 17 OF 20
PER CITY REVIEW 11/9/23	CADD:
PER WCWRC REVIEW 12/21/23	ENG: JCA
	PM: SWB
	TECH:
	/23015SM1

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M:\Civil3d_Proj_2023\23015\Site Plan\23015SM1.dwg, 3/25/2024 11:15 AM, Jim Ahnert, 17 Prop Detention, MCLLC PDF.pc3

EXISTING DETENTION BASIN MODIFCATIONS TO OUTLET CONTROL STRUCTURE

BASED ON REDUCED TRIBUTARY AREA

Detention Pond Volumes:

A. First Flush, Bankfull Flood and 100-year Storm Event

1. Contributing Area = 2.91 Ac.
2. Developed Runoff Coefficient:

	Area (A), Ac.	Coefficient (C)	A x C
Rooftop	0.64	0.95	0.61
Drives/Walks	0.94	0.95	0.89
Lawn/Landscaped Area	0.90	0.30	0.27
Pond	0.43	1.00	0.43
Totals:	2.91		2.20

Developed C = 2.20 / 2.91 = 0.76

3. First Flush Volume:
   V = (0.5"/12) x 43,560 x 0.76 x 2.91 = 3995 CF
4. Bankfull Flood Volume:
   V = 8,170 x 0.76 x 2.91 = 17982 CF
5. 100-Year Flood Volume:
   Q_A = 0.15 x 2.91 = 0.44 CFS
   Q_O = 0.4365 /(2.91 x 0.7564) = 0.20 CFS/Ac-Imp.
   T = -25 + (10,312.50 / 0.20)^0.5 = 203.03 min.
   V_S = ((16,500 x 203.03) / (203.03 +25))-(40 x 0.20 x 203.03) = 13080 CF/Ac-Imp.
   V_T = 13080 x 2.91 x 0.7564 = 28790 CF

B. Detention Volume Proposed

	Elev.	Area(sf)	Vol (cf)	Acc. Vol.(cf)
$Elev_b$ =	953.15	0		
	953.75	13891	2778	2778
	954.0	15926	3724	6502
	955.0	18760	17324	23826
	956.0	32691	25405	49231

Total: 46453 CF

The following interpolations determine the pond water elevations for the three different storm events:

First Flush: (954.0 - 953.75) / (6502 - 2778) = x / (3995 - 2778); x = $Elev_{ff}$ = 953.83

Bankfull Flood: (955.0 - 954.0) / (23826 - 6502) = x / (17982 - 6502); x = $Elev_{bf}$ = 954.66

100 Yr. Flood: (956.0 - 955.0) / (49231 - 23826) = x / (28790 - 23826); x = 955.20

These yield pond water elevations of 953.83 for the First Flush, 954.66 for the Bankfull Flood, and 955.20 for the 100 Yr. Storm Event

C. Outflow Structure

The Detention Pond will have a 3-stage outlet. This will consist of a perforated manhole with a series of holes in three (3) tiers. The lower tier of holes will detain the first-flush volume in a timeframe to exceed 24 hours. The middle tier along with the lower tier will detain and drain the bankfull flood volume in a timeframe not-to-exceed 48 hours. The upper tier along with the middle and lower tiers will detain the runoff from the site. The perforated manhole will be surrounded by a stone filter.

1. First Flush:

The average allowable release rate for runoff is 0.5" over area of site in 24 hrs.

Q_{ff} = (1/24 hrs) x (1 hr./3600 sec) x 3995 CF = 0.046 CFS

Orifice area at Elev. 953.15 to produce this average discharge:

H = 0.68 FT

H_A = (2/3 H) = 0.45 FT

Area of Orifice = Q_{ff} / (0.62 x (2xgxH_A)^0.5) = 0.0138 SF

Where, H = Head; H_A = Average Head; g = Gravitational Const (32.2 fps)

Area of 1.00 " hole = 0.0055 SF

No. of 1.00 " hole(s) = 0.0138 / 0.0055 = 2.53 hole(s)

Therefore, use

TWO(2) 1.00 " hole(s) at Elev. = 953.15

The detention time for

TWO(2) 1.00 " hole(s) is:

$Q(new)_{ff}$ = $A(new)_{ff}$ x (0.62(2gH_A)^0.5

$Q(new)_{ff}$ = (2 x 0.0055) x (0.62(2gH_A)^0.5

$Q(new)_{ff}$ = 0.037 CFS

$T(new)_{ff}$ = V_{ff} /$Q(new)_{ff}$

$T(new)_{ff}$ = 3995 /(0.037 x 3600) = 30.3 hrs.

2. Bankfull Flood:

The bankfull flood must be detained in 36-48 hrs, check the discharge through the first-flush orifice to see if additional holes are necessary:

H = 1.51 FT

H_A = (2/3 H) = 1.01 FT

Q_{ff} = 0.62 (2) holes x 0.0055 sf/hole x (2 x 32.2 x 1.01)^0.5

Q_{ff} = 0.055 CFS

Time to empty Basin at this discharge:

T_{ff} = (sec/ 0.055 CF) x (17982 CF) x (1 hr./3600sec)

T_{ff} = 91.6 hrs.

Since T_{ff} > 48 hrs, additional holes are necessary.

A target release time of 44.0 hrs. will be chosen for the bankfull flood. The volume above the first-flush water surface and below the bankfull flood elevation is the volume remaining (V(rem)).

V(rem)= V_{bf} - V_{ff}

V(rem)= 17982 CF - 3995 CF = 13987 CF

T(rem)= T(tot) - T(new) $_{ff}$

T(rem)= 44.0 hrs. - 30.3 hrs. = 13.7 hrs.

Volume through TWO(2) 1.00 " hole(s) in 13.7 hrs. is:

$H(avg)_{ff}$ = 2/3(Elev $_{bf}$ -Elev. $_{ff}$)+(Elev. $_{ff}$ - Elev $_b$)

= 2/3(954.66 - 953.83) +(953.83 - 953.15) = 1.24 FT

Q_1 = discharge through FF orifices when both the FF and BF holes are contributing:

Q_1 =A_{ff} x (2g$H(avg)_{ff}$)^0.5

Q_1 = (2 x 0.0055) x (0.62(2g$H(avg)_{ff}$)^0.5

Q_1 = 0.060 CFS

V_1 = T(rem) x Q_1

V_1 = 13.7 x 0.060 x 3600 = 2969.2 CF

V_2 = V(rem) - V_1

V_2 = 13987 - 2969.19 = 11018 CF

Q_2 = V_2 / T(rem) = 11018 /(13.7 x 3600) = 0.224 CFS

$H(avg)_{bf}$ = 2/3(Elev $_{bf}$ -Elev $_{FI}$)

Note: Calculation adjusted due to as-built bankfull holes elevation

$H(avg)_{bf}$ = 2/3(954.66 - 953.90) = 0.51 FT

Area of Orifice = Q_2 / (0.62(2g$H(avg)_{bf}$)^0.5) = 0.0631 SF

Area of 1.75 " hole = 0.0167 SF

No. of 1.75 " hole(s) = 0.0631 / 0.0167 = 3.78 hole(s)

Therefore, use

Note: Calculation adjusted due to as-built bankfull holes elevation

TWO(2) 1.75 " hole(s) at Elev. = 953.90

3. 100 yr. Flood:

This basin is designed to pass the 100-year storm event without overtopping the basin.

Flow Required to pass:

Q_A = (0.15 x 2.91 Ac.) = 0.437 CFS

At the required 100-year detention volume elevation, the

TWO(2) 1.00 " hole(s) designed for the first flush and the

TWO(2) 1.75 " hole(s) designed for the bankfull flood will discharge:

Q = 0.62(2 x 0.0055) x (2 x 32.2 x 2.05)^0.5

+ 0.62(2 x 0.0167) x (2 x 32.2 x 1.36)^0.5 = 0.2717 CFS

The remaining allowable outflow= 0.437 - 0.2717 = 0.165 CFS

Note: Calculation adjusted due to as-built bankfull holes elevation

0.62(A)(2 x 32.2 x (955.20 - 954.94) ^ 0.5 = 0.165 CFS

A = 0.066 SF

Area of 1.75 " hole = 0.0167 SF

No. of 1.75 " hole(s) = 0.0655 / 0.0167 = 3.92 hole(s)

Therefore, use

THREE(3) 1.75 " hole(s) at Elev. = 954.94

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OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
EXISTING BASIN CALCULATIONS FOR OUTLET MODIFICATION

18

JOB No. 23015

REVISIONS:
PER WCWRC COMMENTS 12/21/23

DATE: 12/21/23
SHEET 18 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015SM1

Know what's below. Call before you dig.

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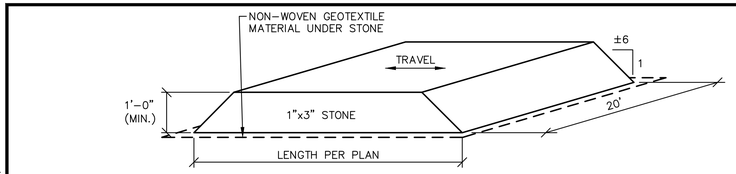


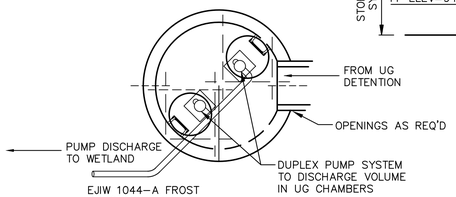
GRAVEL MUD TRACKING MAT (60t)

NOT TO SCALE

Storm Water Pump Chamber Notes

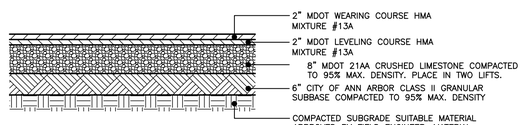
1. The detention chambers, pump chamber and all penetrations into each shall be waterproofed and water tight.
2. The MEP designer shall specify the pumps and controls for the pump chamber. Controls shall be located in a secure area. A visible and audible alarm shall be provided on a separate circuit from the pumps. The pumps shall be on a separate circuit from each other.
3. The pump system shall consist of a duplex, submersible system with controls for:
   - Lead pump on/off
   - Lag pump on/off
   - High water alarm

   The lead and lag pump shall alternate run cycles. The alarm shall be located near the chamber and labeled with a sign "Detention Chamber High Water Level Alarm"
4. Two access castings such as an East Jordan Iron Works #1044A shall be located in the roof of the pump chamber in close proximity to a wall of the detention chamber below. Steps or a ladder shall be provided for entry into the chamber.
5. The detention chamber walls and the pump chamber metering wall shall be designed to withstand nine feet of hydraulic pressure.
6. The discharge piping and the forcemain shall be secured from movement in the pump chamber and manhole.
7. The pumps specified by the MEP will be required to deliver 85 GPM under 15 feet of total dynamic head.
8. Designs, specifications and product selections will be forwarded to the civil engineer for review and approval.



DUPLEX PUMP CHAMBER DETAIL

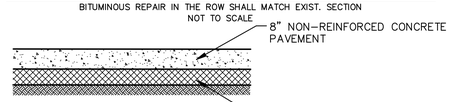
NOT TO SCALE



ONSITE BITUMINUOUS PAVEMENT SECTION

BITUMINOUS REPAIR IN THE ROW SHALL MATCH EXIST. SECTION

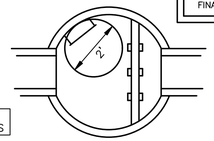
NOT TO SCALE



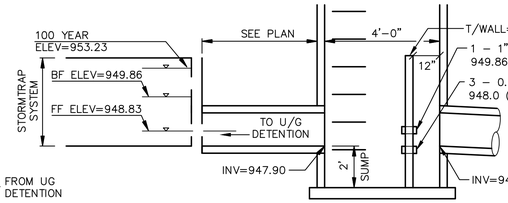
NOTE: ALL CONCRETE PAVEMENT TO BE SEALED WITH ONE APPLICATION OF A TRANSPARENT CURING COMPOUND APPLIED AT A RATE OF 1 gal. per 200 sq. ft..

PROP. HEAVY DUTY CONCRETE DETAIL

NOT TO SCALE



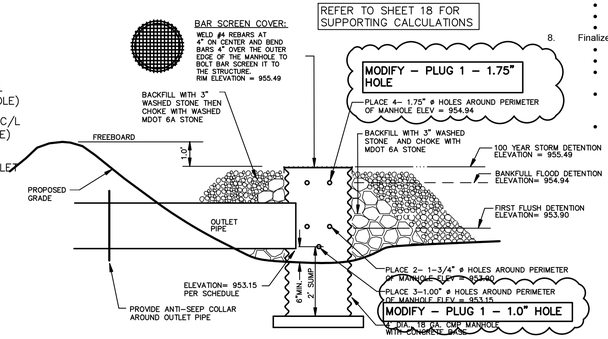
REFER TO SHEET 17 FOR SUPPORTING CALCULATIONS



UNDERGROUND DETENTION AREA OUTLET

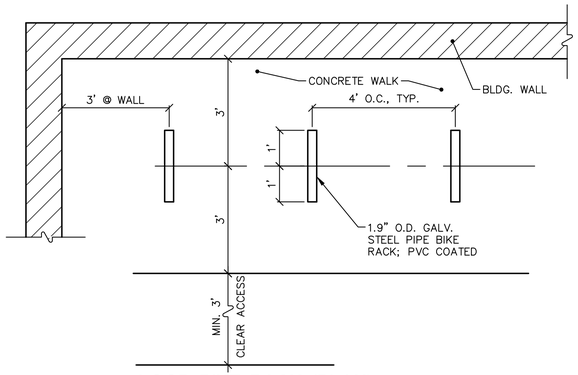
MANHOLE DETAIL W/RESTRICTED OUTLET

REFER TO SHEET 18 FOR SUPPORTING CALCULATIONS



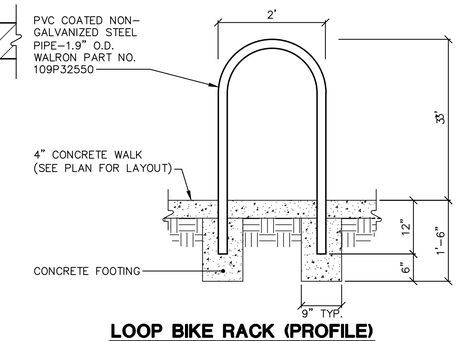
MODIFICATIONS TO NORTH DETENTION POND OUTLET DETAIL

NOT TO SCALE



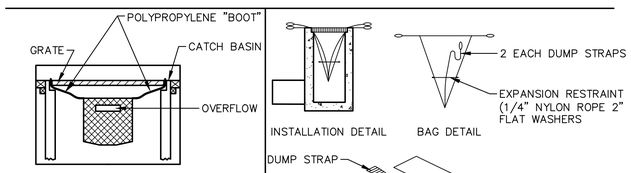
LOOP BIKE RACK (PLAN)

NOT TO SCALE



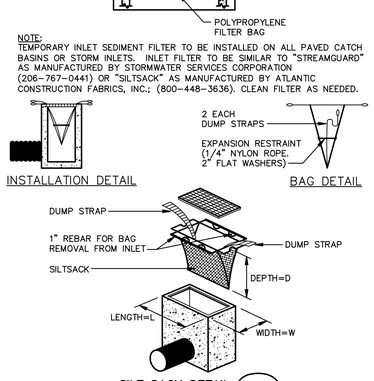
LOOP BIKE RACK (PROFILE)

NOT TO SCALE



EROSION CONTROL INLET FILTER (58t)

NOT TO SCALE



SILT SACK DETAIL (59t)

NO SCALE

CONSTRUCTION SEQUENCE	OPERATION TIME SCHEDULE BEGINNING APRIL 2024 — 2024							
	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.
SESC PRE-GRADING MEETING								
INSTALL AND MAINTAIN SOIL EROSION CONTROL MEASURES AS REQUIRED								
UTILITY INSTALLATION AND SITE DEMOLITION								
FOUNDATION CONSTRUCTION								
BUILDING CONSTRUCTION								
FINAL GRADE SITE								
PLACE MULCH AND SEEDING								
FINAL CLEAN-UP & REMOVAL OF SOIL EROSION CONTROLS								

Estimated Construction Sequence
4/1/2024 thru 11/1/2024

1. Inventory Site: 4/1/2024 (1 week)
   - SESC pre-grading meeting
   - Identify construction limits and define site access
   - Install construction fencing as required to secure site
2. Install Soil Erosion Control Measures: 4/08/2024 (1 week)
   - Install silt fence and mud tracking mat
3. Utility Installation: 4/15/2024 (3 weeks)
   - Install underground detention
   - Install water main and water main leads
   - Install sanitary sewer lead
   - Install silt sack on completed inlets
4. Foundation Construction: 5/6/2024 (3 weeks)
   - Maintain existing controls; install permanent controls within five (5) days after final grading or final grade change
   - Existing Drive will be sufficient for issuance of vertical building permit
5. Building Construction: 5/27/2024 (18 weeks)
   - Maintain existing controls; install permanent controls within five (5) days after final grading or final grade change
   - Construct building above grade
   - Complete roof and plumb roof drains to detention chambers
6. Fine Grade the Site, install Sidewalk, Curb and Gutter, Final Street Paving and continue Building Construction: 9/30/2024 (3 weeks)
   - Maintain existing controls
   - Install Sidewalk, Curb and Gutter and Final Street Paving
   - Plant trees and landscape items
7. Follow-Up After the Site is Stabilized: 10/21/2024 (1 week)
   - Remove construction fence and install new fencing
   - Remove catch basin silt sacks
   - Remove sediment from detention chambers and storm sewer system
   - Clean up debris
8. Finalize Building Construction: 10/28/2024 (1 week)
   - Maintain permanent soil erosion control measures
   - Remove construction fencing
   - Prior to the first Certificate of Occupancy, all Life Safety Systems shall be completed, tested and approved.
   - A "Knox Box" emergency responder access system shall be installed prior to the first Certificate of Occupancy. Forms for the Knox Box are available thru Fire Prevention.
   - Provide as-built certification of the storm water detention system.

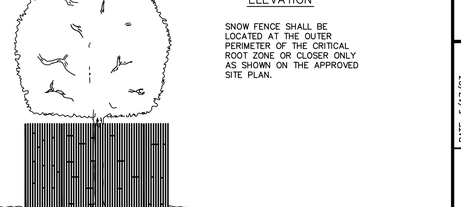
STORM WATER MANAGEMENT SYSTEM PERMANENT MAINTENANCE PLAN, SCHEDULE, AND COST ESTIMATE

MAINTENANCE PLAN BUDGET

Annual inspection of system for sediment accumulation	$350.00
Removal of sediment accumulation every two (2) years, as needed	$600.00
Inspect for floatables and debris annually and after major storms	$300.00
Removal of floatables and debris annually and after major storms	$600.00
Inspect system for erosion annually and after major storms	$300.00
Re-establish permanent vegetation on eroded slopes, as needed	$200.00
Clean drives semiannually	$250.00
Total Annual Budget	**$2,600.00**

PERMANENT MAINTENANCE TASKS AND SCHEDULE

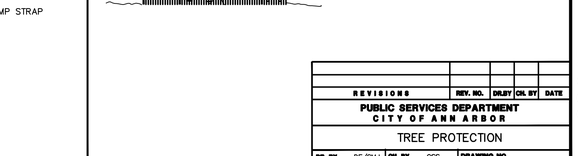
	Components					
	Drives and Walks	Storm Sewer System	Catch Basin Sumps	Catch Basin Inlet Castings	Detention Chambers	Schedule
Inspect for sediment accumulation	X	X	X		X	annually
Removal of sediment accumulation		X	X		X	every 2 years, as needed
Inspect for floatables and debris		X	X	X	X	annually
Cleaning of floatables and debris		X	X	X	X	annually
Clean streets	X					semi-annually



*THICKNESS INCREASE TO 6" AT DRIVE CROSSINGS

CONCRETE WALK DETAIL

NO SCALE



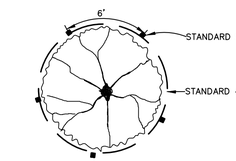
NOTES:

1. THE CONCRETE WASHOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT ON THIS PROJECT.
2. SIGNS SHALL BE PLACED AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT.
3. THE CONCRETE WASHOUT AREA WILL BE REPLACED AS NECESSARY TO MAINTAIN CAPACITY FOR WASTE CONCRETE AND OTHER LIQUID WASTE.
4. WASHOUT RESIDUE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF AT AN APPROVED WASTE SITE.
5. DO NOT MIX EXCESS AMOUNTS OF FRESH CONCRETE OR CEMENT ON-SITE.
6. DO NOT WASH OUT CONCRETE TRUCKS INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS.
7. AVOID DUMPING EXCESS CONCRETE IN NON-DESIGNATED DUMPING AREAS.
8. LOCATE WASHOUT AREA AT LEAST 50' (15 METERS) FROM STORM DRAINS, OPEN DITCHES, OR WATERBODIES.
9. WASH OUT WASTES INTO THE OUTPACK WASHOUT AS SHOWN WHERE THE CONCRETE CAN SET, BE BROKEN UP, AND THEN DISPOSED OF PROPERLY.

OR APPROVED EQUAL

CONCRETE WASHOUT SYSTEM

NOT TO SCALE



SNOW FENCE SHALL BE LOCATED AT THE OUTER PERIMETER OF THE CRITICAL ROOT ZONE OR CLOSER ONLY AS SHOWN ON THE APPROVED SITE PLAN.

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

M:\Civil\34_Proj\2023\23015\Site Plan\23015DT1.dwg, 3/25/2024 11:15 AM, Jim Ahnert, 17 MISCELLANEOUS DETAILS, MCLLC PDF.pc3
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BRE NIXON RD. ASSOCIATES, LLC
260 E. BROWN ST.
BIRMINGHAM, MICHIGAN 48009
ADAM BLEZNAK
(248) 540-9300

OWL CREEK PHASE 2

SITE PLAN FOR CITY COUNCIL AND REZONING
MISCELLANEOUS DETAILS

19

DATE: 5/17/23
SHEET 19 OF 20
CADD:
ENG: JCA
PM:
TECH: SWB
/23015DT1

REVISIONS:	REV. DATE
PER CITY REVIEW	8/1/23
PER CITY REVIEW	11/9/23

JOB No. 23015

REVISIONS	REV. NO.	DR.BY	CH. BY	DATE

PUBLIC SERVICES DEPARTMENT
CITY OF ANN ARBOR

TREE PROTECTION

DR. BY	DF/SMJ	CH. BY	CSS	DRAWING NO.
SCALE	NONE	DATE	11-6-92	SD-M-1
HIGH				SHEET NO. ____ OF ____

TAG#	DIA	STEMS	COMMON NAME	GENUS/SPECIES	REMARKS	REMOVE
2001	7"		Silver Maple	Acer saccharinum		
2002	12"		Silver Maple	Acer saccharinum		
2003	12"		Silver Maple	Acer saccharinum		
2004	14"		Silver Maple	Acer saccharinum		
2005	13"		Silver Maple	Acer saccharinum		
2006	11"		Willow Black	Salix nigra		
2007	18"		Silver Maple	Acer saccharinum	LM	
2008	12"		Silver Maple	Acer saccharinum		
2009	11"		Bitternut Hickory	Carya cordiformis		
2010	9"		Black Cherry	Prunus serotina		
2011	10"		Black Cherry	Prunus serotina		
2012	9"		Black Cherry	Prunus serotina		
2013	6"		Black Cherry	Prunus serotina		
2014	8"		Black Cherry	Prunus serotina		
2015	11"		Silver Maple	Acer saccharinum		
2016	13"		Silver Maple	Acer saccharinum		
2017	11"		Willow Black	Salix nigra		
2018	8"		Silver Maple	Acer saccharinum		
2019	10"		Silver Maple	Acer saccharinum		
2020	9"		Silver Maple	Acer saccharinum		
2021	12"		Silver Maple	Acer saccharinum		
2022	10"	twin	Plum, Wild	Prunus americana	LM	
2023	8"		Black Cherry	Prunus serotina		
2024	6"		Black Cherry	Prunus serotina		
2025	12"		Silver Maple	Acer saccharinum		
2026	9"		Black Cherry	Prunus serotina		
2027	8"		Black Cherry	Prunus serotina		
2028	9"		Black Cherry	Prunus serotina		
2029	7"		Black Cherry	Prunus serotina		
2030	8"		Black Cherry	Prunus serotina		
2031	13"		Black Cherry	Prunus serotina		
2033	7"		Black Cherry	Prunus serotina		
2035	9"		Black Cherry	Prunus serotina		
2036	10"		Black Cherry	Prunus serotina		
2037	8"		Black Cherry	Prunus serotina		
2038	9"		Black Cherry	Prunus serotina		
2042	6"		Black Cherry	Prunus serotina		
2044	8"		Black Cherry	Prunus serotina	40%	
2045	8"		Black Cherry	Prunus serotina		
2046	12"		Black Cherry	Prunus serotina	40%	
2047	8"		Black Cherry	Prunus serotina		
2048	9"		American Elm	Ulmus americana		
2049	6"		Black Cherry	Prunus serotina		
2050	9"		Black Cherry	Prunus serotina		
2051	6"		Black Cherry	Prunus serotina		
2052	9"		Black Cherry	Prunus serotina	40%	
2053	10"		Black Cherry	Prunus serotina		
2054	8"		Black Cherry	Prunus serotina		
2055	8"		Black Cherry	Prunus serotina		
2056	7"		Black Cherry	Prunus serotina		
2057	14"		Silver Maple	Acer saccharinum		
2058	20"		Willow Black	Salix nigra		
2059	8"		Black Cherry	Prunus serotina		
2060	10"		Black Cherry	Prunus serotina		
2061	17"		Willow Black	Salix nigra	40%	
2062	8"		Swamp White Oak	Quercus bicolor		
2063	32"		Willow Black	Salix nigra	LM	
2064	6"		American Elm	Ulmus americana		
2065	12"		American Elm	Ulmus americana		
2066	11"		Linden	Tilia americana		
2067	10"		Linden	Tilia americana		
2068	9"		Linden	Tilia americana		
2069	12"		Linden	Tilia americana		
2070	7"		American Elm	Ulmus americana		
2071	13"		Willow Black	Salix nigra		
2072	11"		Linden	Tilia americana		
2073	25"		Willow Black	Salix nigra	LM	
2074	9"		Linden	Tilia americana		
2075	16"		Black Cherry	Prunus serotina		
2076	8"		American Elm	Ulmus americana		
2077	10"		American Elm	Ulmus americana		
2078	8"		American Elm	Ulmus americana		
2079	9"		American Elm	Ulmus americana		
2080	8"		Linden	Tilia americana		
2081	7"		American Elm	Ulmus americana	40%	
2082	9"		Black Cherry	Prunus serotina		
2083	9"		Shagbark Hickory	Carya ovata		
2087	8"		Shagbark Hickory	Carya ovata		
2088	24"		Linden	Tilia americana	LM / 60%	
2095	10"		Black Cherry	Prunus serotina		
2096	8"		Plum, Wild	Prunus americana		
2097	9"		American Elm	Ulmus americana		
2098	8"		American Elm	Ulmus americana		
2099	14"		American Elm	Ulmus americana		
2100	9"		American Elm	Ulmus americana		
2101	15"		Linden	Tilia americana		
2102	11"		American Elm	Ulmus americana		
2103	15"		Willow Black	Salix nigra		
2104	9"		American Elm	Ulmus americana		
2105	13"		Linden	Tilia americana		
2106	9"		Linden	Tilia americana		
2107	9"		American Elm	Ulmus americana		
2108	20"		Silver Maple	Acer saccharinum	LM	
2114	8"		American Elm	Ulmus americana		
2115	18"	twin	Willow Black	Salix nigra	LM	
2117	8"		Black Cherry	Prunus serotina		
2118	13"		Linden	Tilia americana		
2119	10"		Black Cherry	Prunus serotina		
2120	14"	twin	Willow Black	Salix nigra		
2133	12"		Linden	Tilia americana		
2134	8"		Linden	Tilia americana		
2135	9"		Linden	Tilia americana		
2136	14"		Linden	Tilia americana		
2137	15"		Willow Black	Salix nigra		
2138	19"		Willow Black	Salix nigra		
2139	10"		American Elm	Ulmus americana		
2140	10"		Linden	Tilia americana		
2141	12"		Linden	Tilia americana		
2142	10"		Black Cherry	Prunus serotina		
2143	8"		American Elm	Ulmus americana		
2144	8"		Linden	Tilia americana		
2145	9"		Linden	Tilia americana		
2154	9"		Linden	Tilia americana		
2155	10"		Linden	Tilia americana		
2156	8"		Black Cherry	Prunus serotina		
2157	13"		Black Cherry	Prunus serotina	40%	
2158	17"		Linden	Tilia americana		
2159	10"		Linden	Tilia americana		
2160	8"		Linden	Tilia americana		
2161	10"		Linden	Tilia americana		
2165	7"		Linden	Tilia americana		
2166	15"		Willow Black	Salix nigra		
2167	22"		Willow Black	Salix nigra		
2168	11"		Silver Maple	Acer saccharinum		
2169	8"		Black Walnut	Juglans nigra		
2170	10"		Willow Black	Salix nigra		
2171	12"		American Elm	Ulmus americana		
2172	12"		Silver Maple	Acer saccharinum		
2173	9"		Cottonwood	Populus deltoides		
2174	18"		Silver Maple	Acer saccharinum	LM	

TAG#	DIA	STEMS	COMMON NAME	GENUS/SPECIES	REMARKS	REMOVE
2175	10"		Silver Maple	Acer saccharinum		
2176	19"	twin	Willow Black	Salix nigra	LM	
2177	15"		Silver Maple	Acer saccharinum		
2178	27"		Silver Maple	Acer saccharinum	LM	
2179	9"		Linden	Tilia americana		
2180	13"		Linden	Tilia americana		
2181	12"		Linden	Tilia americana		
2182	6"		Linden	Tilia americana		
2183	17"		Silver Maple	Acer saccharinum		
2184	13"		Silver Maple	Acer saccharinum		
2185	15"		Silver Maple	Acer saccharinum		
2186	8"		American Elm	Ulmus americana		
2187	10"		Silver Maple	Acer saccharinum		
2188	7"		Silver Maple	Acer saccharinum		
2189	8"		Linden	Tilia americana		
2190	12"		Linden	Tilia americana		
2191	24"		Willow Black	Salix nigra	LM	
2192	28"		Cottonwood	Populus deltoides	LM	
2193	12"		Linden	Tilia americana		
2194	6"		Linden	Tilia americana		
2195	8"	triple	Silver Maple	Acer saccharinum		
2196	25"		Cottonwood	Populus deltoides	LM	
2197	13"		Linden	Tilia americana		
2198	11"		Silver Maple	Acer saccharinum		
2199	22"		Cottonwood	Populus deltoides		
2200	10"		Cottonwood	Populus deltoides		
2201	21"		Cottonwood	Populus deltoides		
2202	8"		Cottonwood	Populus deltoides		
2203	8"		Black Cherry	Prunus serotina		
2204	9"		Black Cherry	Prunus serotina		
2205	14"		American Elm	Ulmus americana	40%	
2206	10"		American Elm	Ulmus americana	40%	
2210	15"		Cottonwood	Populus deltoides		
2211	22"		American Elm	Ulmus americana	LM	
2212	6"	triple	Silver Maple	Acer saccharinum		
2213	6"		Pear Common	Pyrus communis		
2214	8"		Black Cherry	Prunus serotina		
2215	7"		Box Elder	Acer negundo		
2216	9"		American Elm	Ulmus americana		
2217	19"		Cottonwood	Populus deltoides		
2218	8"		Box Elder	Acer negundo		
2219	11"		Black Cherry	Prunus serotina		
2220	8"		American Elm	Ulmus americana		
2225	21"		Box Elder	Acer negundo	LM	
2234	12"		Box Elder	Acer negundo		
2235	11"		Common Apple	Malus pumila		
2236	9"		American Elm	Ulmus americana		
2237	8"		Red Cedar	Juniperus virginiana		
2263	11"		Box Elder	Acer negundo		
2264	8"	twin	Box Elder	Acer negundo		
2267	8"		Bitternut Hickory	Carya cordiformis		
2277	8"		Catalpa	Catalpa speciosa	INV	
2279	8"		Black Maple	Acer nigrum		
2281	21"		Catalpa	Catalpa speciosa	INV	
2282	27"		Sugar Maple	Acer saccharum	LM	
2283	23"		Catalpa	Catalpa speciosa	INV / 60%	
2284	16"		Black Cherry	Prunus serotina		
2285	8"		Bitternut Hickory	Carya cordiformis		
2286	28"		Cottonwood	Populus deltoides	LM	
2287	9"		Silver Maple	Acer saccharinum		
2288	18"		American Elm	Ulmus americana	LM	
2289	18"		Catalpa	Catalpa speciosa	INV	
2291	16"		Shagbark Hickory	Carya ovata	LM / 60%	
2292	15"		Shagbark Hickory	Carya ovata		
2293	15"		White Oak	Quercus alba		
2294	13"		Bitternut Hickory	Carya cordiformis		
2295	8"		Bitternut Hickory	Carya cordiformis		
2296	17"		Bitternut Hickory	Carya cordiformis	LM	
2297	15"		White Oak	Quercus alba		
2298	16"		Shagbark Hickory	Carya ovata	LM	
2299	11"		White Oak	Quercus alba		
2300	12"		Black Maple	Acer nigrum		
2301	11"		Black Maple	Acer nigrum		
2302	13"		Linden	Tilia americana		
2303	11"		Linden	Tilia americana		
2304	8"		Silver Maple	Acer saccharinum		
2305	12"		Silver Maple	Acer saccharinum		
2306	11"		Shagbark Hickory	Carya ovata		
2307	6"	twin	Shagbark Hickory	Carya ovata		
2308	8"		Shagbark Hickory	Carya ovata		
2309	17"		Silver Maple	Acer saccharinum		
2310	17"		Silver Maple	Acer saccharinum		
2311	14"		Silver Maple	Acer saccharinum		
2312	15"	twin	Shagbark Hickory	Carya ovata	LM	
2313	13"		Silver Maple	Acer saccharinum		
2314	9"		Silver Maple	Acer saccharinum		
2315	14"		American Elm	Ulmus americana		
2316	15"		Black Cherry	Prunus serotina		
2317	9"		Linden	Tilia americana		
2318	6"		Silver Maple	Acer saccharinum		
2319	9"		Black Maple	Acer nigrum		
2320	15"		Black Maple	Acer nigrum		
2321	9"		Bitternut Hickory	Carya cordiformis		
2322	11"		Bitternut Hickory	Carya cordiformis		
2323	16"		Red Oak	Quercus rubra	LM	
2324	8"		Bitternut Hickory	Carya cordiformis		
2325	11"		Linden	Tilia americana		
2326	8"		Linden	Tilia americana		
2327	9"		Bitternut Hickory	Carya cordiformis		
2328	8"		American Elm	Ulmus americana	40%	
2329	9"		White Mulberry	Morus alba		
2330	12"		Silver Maple	Acer saccharinum		
2331	11"		Silver Maple	Acer saccharinum		
2332	10"		Silver Maple	Acer saccharinum		
2338	8"		Bitternut Hickory	Carya cordiformis		
2377	11"	triple	Shagbark Hickory	Carya ovata	LM	
2387	9"		American Elm	Ulmus americana	40%	
2388	9"		Black Cherry	Prunus serotina		
2389	11"		Black Cherry	Prunus serotina		
2390	9"		Red Oak	Quercus rubra		
2391	8"		American Elm	Ulmus americana		
2392	10"		Linden	Tilia americana		
2393	9"		American Elm	Ulmus americana		
2394	10"		Linden	Tilia americana		
2395	12"		Linden	Tilia americana		
2396	13"		Shagbark Hickory	Carya ovata		
2399	9"		Shagbark Hickory	Carya ovata		
2400	9"		Shagbark Hickory	Carya ovata		
2401	12"		Shagbark Hickory	Carya ovata		
#REF!	14"		Shagbark Hickory	Carya ovata		
2404	11"		Shagbark Hickory	Carya ovata		
2405	6"		Linden	Tilia americana		
2406	9"		Linden	Tilia americana		
2407	8"		Linden	Tilia americana		
2408	9"		Linden	Tilia americana		
2409	12"		Linden	Tilia americana		
2410	11"		Black Cherry	Prunus serotina		
2411	10"		Black Cherry	Prunus serotina		
2412	12"		Black Cherry	Prunus serotina		
2413	8"		Black Cherry	Prunus serotina		

TAG#	DIA	STEMS	COMMON NAME	GENUS/SPECIES	REMARKS	REMOVE
2414	10"		Silver Maple	Acer saccharinum		
2415	14"		Black Cherry	Prunus serotina		
2416	11"		Black Cherry	Prunus serotina		
2417	11"		Black Cherry	Prunus serotina		
2418	10"		Black Cherry	Prunus serotina		
2419	7"		Black Cherry	Prunus serotina		
2420	9"		Black Cherry	Prunus serotina		
2421	8"		Black Cherry	Prunus serotina	40%	
2422	8"		Black Cherry	Prunus serotina		
2423	9"		Black Cherry	Prunus serotina		
2424	6"	twin	Black Cherry	Prunus serotina		
2425	9"		Black Cherry	Prunus serotina		
2426	8"		Black Cherry	Prunus serotina		
2427	11"		Black Cherry	Prunus serotina		
2428	11"		Black Cherry	Prunus serotina		
2431	9"		Black Cherry	Prunus serotina		
2432	10"		Black Cherry	Prunus serotina		
2467	9"		Silver Maple	Acer saccharinum		
2468	8"		Silver Maple	Acer saccharinum		
2469	16"	twin	Silver Maple	Acer saccharinum	40%	
2470	25"		Silver Maple	Acer saccharinum	40%	
2471	12"		Silver Maple	Acer saccharinum	40%	
2472	23"		Silver Maple	Acer saccharinum	LM / 40%	
2473	22"		Silver Maple	Acer saccharinum	LM / 60%	
2474	10"		Silver Maple	Acer saccharinum		
2475	13"		Silver Maple	Acer saccharinum		
2476	15"		Silver Maple	Acer saccharinum		
2477	9"		Black Cherry	Prunus serotina	40%	
2478	9"		Bitternut Hickory	Carya cordiformis		
2479	8"		Silver Maple	Acer saccharinum		
2480	9"		Silver Maple	Acer saccharinum		
2481	10"		Silver Maple	Acer saccharinum		
2482	23"		Silver Maple	Acer saccharinum	LM	
2483	11"		Black Cherry	Prunus serotina		
2484	8"		Linden	Tilia americana		
2487	9"		Bitternut Hickory	Carya cordiformis		
2488	9"		Bitternut Hickory	Carya cordiformis		
2489	10"		Bitternut Hickory	Carya cordiformis		
2490	14"		Linden	Tilia americana		
2495	12"		Linden	Tilia americana		
2496	17"		Linden	Tilia americana	40%	
2497	15"		Silver Maple	Acer saccharinum		
2498	23"		Silver Maple	Acer saccharinum	LM	
2499	15"		Silver Maple	Acer saccharinum		
2500	16"		Silver Maple	Acer saccharinum		
2501	26"		Cottonwood	Populus deltoides	LM	
2502	26"		Cottonwood	Populus deltoides	LM	
2503	12"		Cottonwood	Populus deltoides		
2504	16"	twin	Cottonwood	Populus deltoides	LM	
2506	27"		Cottonwood	Populus deltoides	LM	
3501	14"		Black Willow	Salix nigra		
3502	13"		Black Willow	Salix nigra		
3503	9"		American Elm	Ulmus americana		
3504	14"		Black Willow	Salix nigra		
3505	7"		American Elm	Ulmus americana		
3506	15"		Black Willow	Salix nigra	40%	
3507	9"		American Elm	Ulmus americana		
3508	8"		Black Willow	Salix nigra		
3509	11"		White Mulberry	Morus alba		
3510	10"		American Elm	Ulmus americana		
3516	6"		American Elm	Ulmus americana	40%	
3517	8"		Black Walnut	Juglans nigra		
3518	17"		Black Willow	Salix nigra		
3519	17"		Black Willow	Salix nigra		
3520	16"		Black Willow	Salix nigra		
3521	15"		Black Willow	Salix nigra		
3522	13"		Black Willow	Salix nigra		
3523	12"		Black Willow	Salix nigra		
3524	7"		American Elm	Ulmus americana	40%	
3525	6"	triple	Silver Maple	Acer saccharinum		
3526	9"		Silver Maple	Acer saccharinum		
3527	15"		Black Willow	Salix nigra		
3528	6"		Silver Maple	Acer saccharinum		
3529	11"	triple	Silver Maple	Acer saccharinum	LM	
3530	8"		Silver Maple	Acer saccharinum		

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

M:\Civil3d_Pro1_2023\23015\Site Plan\23015Tl1.dwg, 3/25/2024 11:15 AM, Jim Ahnert, 18 EXISTING TREE LISTING, MCLLC PDF.pc3

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OWL CREEK PHASE 2

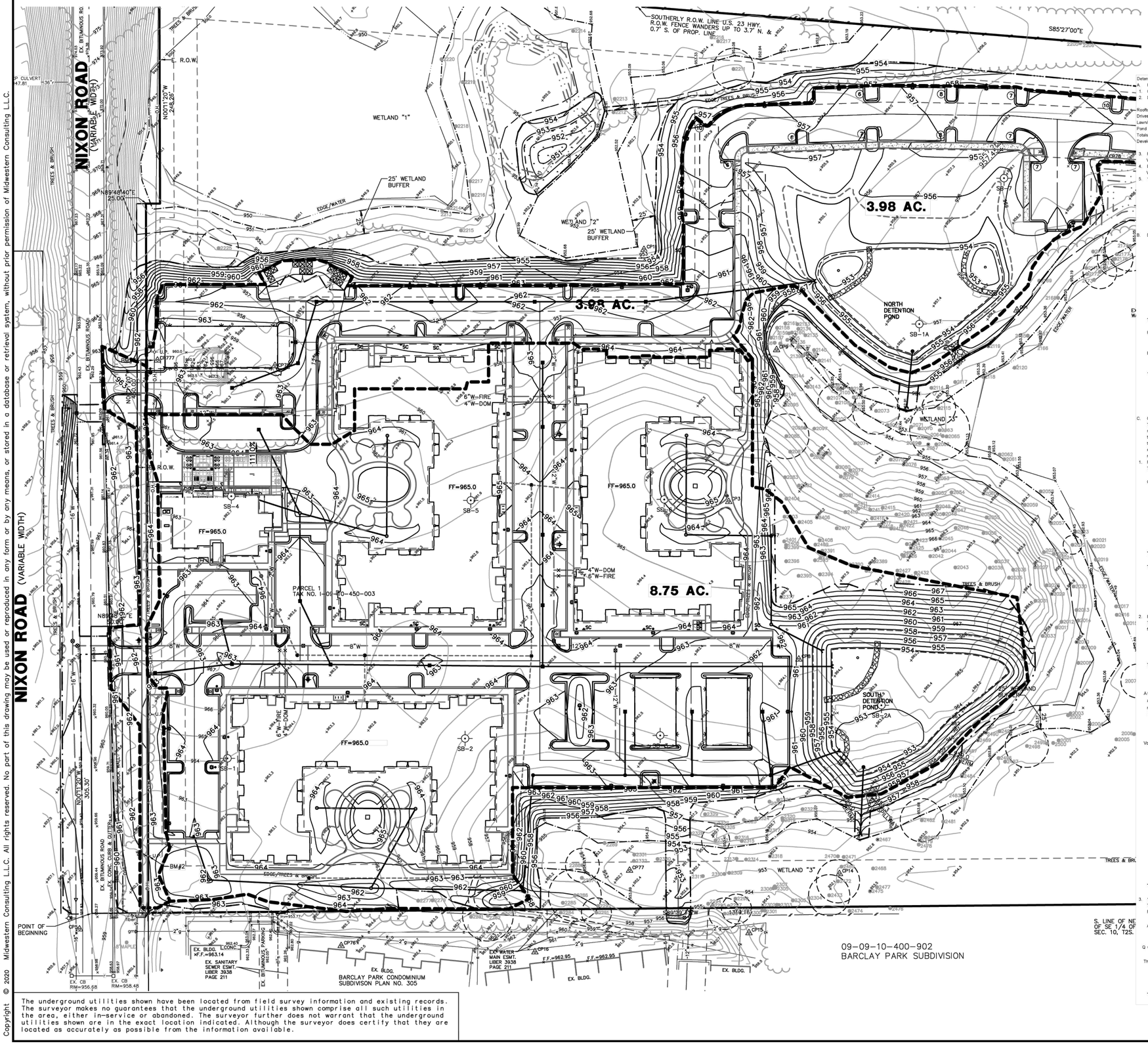
SITE PLAN FOR CITY COUNCIL AND REZONING
EXISTING TREE LISTING

20

JOB No. 23015
REVISIONS:

REV.	DATE

DATE: 5/17/23
SHEET 20 OF 20
CADD:
ENG: JCA
PM: SWB
TECH:
/23015TL1



SCALE: 1" = 50'

0 50 100 150

NOTE:
RUNOFF FROM ALL IMPERVIOUS AREAS WILL BE DIRECTED TO THE ONSITE STORM WATER MANAGEMENT SYSTEM.

DETENTION CALCULATIONS (SOUTH)

Detention Pond Volumes:

A. First Flush, Bankfull Flood and 100-year Storm Event

1. Contributing Area = 8.75 Ac.
2. Developed Runoff Coefficient:

	Area (A), Ac.		Coefficient (C)		A x C
Rooftop	2.76		0.95		2.62
Drives/Walks	2.77		0.95		2.63
Lawn/Landscaped Area	2.71		0.30		0.81
Pond	0.51		1.00		0.51
Totals:	8.75				6.58
Developed C =	6.58 /	8.75	=		0.75

3. First Flush Volume:
V = (0.5")/12 x 43,560 x 0.75 x 8.75 = 11911 CF
4. Bankfull Flood Volume:
V = 8,170 x 0.75 x 8.75 = 53616 CF
5. 100-Year Flood Volume:
Q_{Ai} = 0.15 x 8.75 = 1.31 CFS
Q_{Di} = 1.3125 /(8.75 x 0.75) = 0.20 CFS/Ac-Imp.
T = -25 + (10,312.50 / 0.20)^0.5 = 202.07 min.
V_S = ((16,500 x 202.07) / (202.07 +25))/(40 x 0.20 x 202.07) = 13067 CF/Ac-Imp.
V_T = 13067 x 8.75 x 0.75 = 85751 CF

B. Detention Volume Proposed

	Elev.	Area(sf)	Vol.(cf)	Acc. Vol.(cf)
$Elev_b$ =	952.8	0		
	953.0	4223	352	352
	954.0	17187	9976	10328
	955.0	19682	18907	28895
	956.0	22936	21442	50337
	957.0	26049	24478	74813
	958.0	29320	27868	102482
	958.2	29993	5931	108413
	Total:		108413 CF	

The following interpolations determine the pond water elevations for the three different storm events:

First Flush: 955.0 - 954.0 , x - 954.0
28895 - 10328 11911 - 10328
x = $Elev_F$ = 954.09

Bankfull Flood: 957.0 - 956.0 , x - 956.0
74813 - 50337 53616 - 50337
x = $Elev_{BF}$ = 956.13

100 Yr. Flood: 958.0 - 957.0 , x - 957.0
102482 - 74813 85751 - 74813
x = 957.40

These yield pond water elevations of 954.09 for the First Flush,
956.13 for the Bankfull Flood,
and 957.40 for the 100 Yr. Storm Event

C. Outflow Structure
The Detention Pond will have a 3-stage outlet. This will consist of a perforated manhole with a series of holes in three (3) tiers. The lower tier of holes will detain the first-flush volume in a timeframe to exceed 24 hours. The middle tier along with the lower tier will detain and drain the bankfull flood volume in a timeframe not-to-exceed 48 hours. The upper tier along with the middle and lower tiers will detain the runoff from the site. The perforated manhole will be surrounded by a stone filter.

1. First Flush:
The average allowable release rate for runoff is 0.5" over area of site in 24 hrs.
Q_R = (1/24 hrs) x (1 hr./3600 sec) x 11911 CF = 0.138 CFS
Orifice area at Elev. 952.75 to produce this average discharge:
H = 1.34 FT
H_A = (2/3 H) = 0.89 FT
Area of Orifice = Q_R / (0.62 x (2xgH$_A$)^0.5) = 0.0294 SF
Where, H = Head
H_A = Average Head
g = Gravitational Const (32.2 fps)
Area of 1.25" hole = 0.0085 SF
No. of 1.25" hole(s) = 0.0294 / 0.0085 = 3.45 hole(s)
Therefore, use
THREE(3) 1.25 " hole(s) at Elev. = 952.75
The detention time for
THREE(3) 1.25 " hole(s) is:
$Q(new)_{FF}$ = A(new)$_A$ x (0.62(2gH$_A$)^0.5
$Q(new)_{FF}$ = (3 x 0.0085) x (0.62(2gH$_A$)^0.5
$Q(new)_{FF}$ = 0.120 CFS
$T(new)_{FF}$ = V_R /Q(new)$_R$
$T(new)_{FF}$ = 11911 /(0.120 x 3600) = 27.6 hrs.

2. Bankfull Flood:
The bankfull flood must be detained in 36-48 hrs, check the discharge through the first-flush orifice to see if additional holes are necessary:
H = 3.38 FT
H_A = (2/3 H) = 2.26 FT
Q_R = 0.62 (3) holes x 0.0085 sf/hole x (2 x 32.2 x 2.26)^0.5
Q_F = 0.191 CFS
Time to empty Basin at this discharge:
T_F = (sec/ 0.191 CF) x (53616 CF) x (1 hr./3600sec)
T_F = 78.0 hrs.
Since T_F > 48 hrs, additional holes are necessary.
A target release time of 44.0 hrs, will be chosen for the bankfull flood. The volume above the first-flush water surface and below the bankfull flood elevation is the volume remaining (Vrem)$_1$:
$V(rem)_1$ = V_{BF} - V_F
$V(rem)_1$ = 53616 CF - 11911 CF = 41705 CF
$T(rem)_1$ = T(bf) - $T(rem)_F$
$T(rem)_1$ = 44.0 hrs. - 27.6 hrs. = 16.4 hrs.
Volume through
THREE(3) 1.25 " hole(s) in 16.4 hrs. is:
$H(avg)_{FF}$ = 2/3(Elev$_{BF}$ - Elev $_A$)+(Elev$_A$ - Elev $_b$)
= 2/3(956.13 - 954.09) +(954.09 - 952.75) = 2.70 FT
Q_1 = discharge through FF orifices when both the FF and BF holes are contributing:
Q_1 = A_{FF} x (2gH(avg)$_{FF}$)^0.5
Q_1 = (3 x 0.0085) x (0.62(2gH(avg)$_{FF}$)^0.5
Q_1 = 0.209 CFS
V_1 = T(rem) x Q_1
V_1 = 16.4 x 0.209 x 3600 = 12367 CF
V_2 = V(rem) - V_1
V_2 = 41705 - 12366.8 = 29338 CF
Q_2 = V_2 / T(rem) = 29338 /(16.4 x 3600) = 0.496 CFS
$H(avg)_{BF}$ = 2/3(Elev$_{BF}$ - Elev$_{FF}$)
$H(avg)_{BF}$ = 2/3(956.13 - 954.09) = 1.37 FT
Area of Orifice = Q_2 / (0.62(2gH(avg)$_{BF}$)^0.5) = 0.0853 SF
Area of 1.50" hole = 0.0123 SF
No. of 1.50 " hole(s) = 0.0853 / 0.0123 = 6.95 hole(s)
Therefore, use
SIX(6) 1.50 " hole(s) at Elev. = 954.09

3. 100 yr. Flood:
This basin is designed to pass the 100-year storm event without overtopping the basin.
Flow Required to pass:
Q_A = (0.15 x 8.75 Ac.) = 1.313 CFS
At the required 100-year detention volume elevation, the
THREE(3) 1.25 " hole(s) designed for the first flush and the
SIX(6) 1.50 " hole(s) designed for the bankfull flood will discharge:
Q = 0.62(3 x 0.0085) x (2 x 32.2 x 4.65)^0.5 =
+ 0.62(6 x 0.0123) x (2 x 32.2 x 3.31)^0.5 = 0.9407 CFS
The remaining allowable outflow = 1.313 - 0.9407 = 0.372 CFS
0.62(A)(2 x 32.2 x (957.40 - 956.13) ^0.5 = 0.372 CFS
A = 0.067 SF
Area of 1.50" hole = 0.0123 SF
No. of 1.50 " hole(s) = 0.0665 / 0.0123 = 5.42 hole(s)
Therefore, use
Five(5) 1.50 " hole(s) at Elev. = 956.13

DETENTION CALCULATIONS (NORTH)

Detention Pond Volumes:

A. First Flush, Bankfull Flood and 100-year Storm Event

1. Contributing Area = 3.98 Ac.
2. Developed Runoff Coefficient:

	Area (A), Ac.		Coefficient (C)		A x C
Rooftop	0.00		0.95		0.00
Drives/Walks	2.00		0.95		1.90
Lawn/Landscaped Area	1.55		0.30		0.47
Pond	0.43		1.00		0.43
Totals:	3.98				2.80
Developed C =	2.80 /	3.98	=		0.70

3. First Flush Volume:
V = (0.5")/12 x 43,560 x 0.70 x 3.98 = 5073 CF
4. Bankfull Flood Volume:
V = 8,170 x 0.70 x 3.98 = 22835 CF
5. 100-Year Flood Volume:
Q_{Ai} = 0.15 x 3.98 = 0.60 CFS
Q_{Di} = 0.597 /(3.98 x 0.7023) = 0.21 CFS/Ac-Imp.
T = -25 + (10,312.50 / 0.21)^0.5 = 194.73 min.
V_S = ((16,500 x 194.73) / (194.73 +25))/(40 x 0.21 x 194.73) = 12959 CF/Ac-Imp
V_T = 12959 x 3.98 x 0.7023 = 36220 CF

B. Detention Volume Proposed

	Elev.	Area(sf)	Vol (cf)	Acc. Vol.(cf)
$Elev_b$ =	953.15	0		
	953.75	13891	2778	2778
	954.0	15926	3724	6502
	955.0	18760	17324	23826
	956.0	32691	25405	49231
	Total:		46453 CF	

The following interpolations determine the pond water elevations for the three different storm events:

First Flush: 954.0 - 953.75 , x - 953.8
6502 - 2778 5073 - 2778
x = $Elev_F$ = 953.90

Bankfull Flood: 955.0 - 954.0 , x - 954.0
23826 - 6502 22835 - 6502
x = $Elev_{BF}$ = 954.94

100 Yr. Flood: 956.0 - 955.0 , x - 955.0
49231 - 23826 36220 - 23826
x = 955.49

These yield pond water elevations of 953.90 for the First Flush,
954.94 for the Bankfull Flood,
and 955.49 for the 100 Yr. Storm Event

C. Outflow Structure
The Detention Pond will have a 3-stage outlet. This will consist of a perforated manhole with a series of holes in three (3) tiers. The lower tier of holes will detain the first-flush volume in a timeframe to exceed 24 hours. The middle tier along with the lower tier will detain and drain the bankfull flood volume in a timeframe not-to-exceed 48 hours. The upper tier along with the middle and lower tiers will detain the runoff from the site. The perforated manhole will be surrounded by a stone filter.

1. First Flush:
The average allowable release rate for runoff is 0.5" over area of site in 24 hrs.
Q_R = (1/24 hrs) x (1 hr./3600 sec) x 5073 CF = 0.059 CFS
Orifice area at Elev. 953.15 to produce this average discharge:
H = 0.75 FT
H_A = (2/3 H) = 0.50 FT
Area of Orifice = Q_R / (0.62 x (2xgH$_A$)^0.5) = 0.0166 SF
Where, H = Head
H_A = Average Head
g = Gravitational Const (32.2 fps)
Area of 1.00" hole = 0.0055 SF
No. of 1.00 " hole(s) = 0.0166 / 0.0055 = 3.05 hole(s)
Therefore, use
THREE(3) 1.00 " hole(s) at Elev. = 953.15
The detention time for
THREE(3) 1.00 " hole(s) is:
$Q(new)_{FF}$ = A(new)$_A$ x (0.62(2gH$_A$)^0.5
$Q(new)_{FF}$ = (3 x 0.0055) x (0.62(2gH$_A$)^0.5
$Q(new)_{FF}$ = 0.058 CFS
$T(new)_{FF}$ = V_R /Q(new)$_R$
$T(new)_{FF}$ = 5073 /(0.058 x 3600) = 24.4 hrs.

2. Bankfull Flood:
The bankfull flood must be detained in 36-48 hrs, check the discharge through the first-flush orifice to see if additional holes are necessary:
H = 1.79 FT
H_A = (2/3 H) = 1.20 FT
Q_R = 0.62 (3) holes x 0.0055 sf/hole x (2 x 32.2 x 1.20)^0.5
Q_F = 0.089 CFS
Time to empty Basin at this discharge:
T_F = (sec/ 0.089 CF) x (22835 CF) x (1 hr./3600sec)
T_F = 71.3 hrs.
Since T_F > 48 hrs, additional holes are necessary.
A target release time of 44.0 hrs, will be chosen for the bankfull flood. The volume above the first-flush water surface and below the bankfull flood elevation is the volume remaining (Vrem)$_1$:
$V(rem)_1$ = V_{BF} - V_F
$V(rem)_1$ = 22835 CF - 5073 CF = 17762 CF
$T(rem)_1$ = T(bf) - $T(rem)_F$
$T(rem)_1$ = 44.0 hrs. - 24.4 hrs. = 19.6 hrs.
Volume through
THREE(3) 1.00 " hole(s) in 19.6 hrs. is:
$H(avg)_{FF}$ = 2/3(Elev$_{BF}$ - Elev $_A$)+(Elev$_A$ - Elev $_b$)
= 2/3(954.94 - 953.90) +(953.90 - 953.15) = 1.45 FT
Q_1 = discharge through FF orifices when both the FF and BF holes are contributing:
Q_1 = A_{FF} x (2gH(avg)$_{FF}$)^0.5
Q_1 = (3 x 0.0055) x (0.62(2gH(avg)$_{FF}$)^0.5
Q_1 = 0.098 CFS
V_1 = T(rem) x Q_1
V_1 = 19.6 x 0.098 x 3600 = 6904.3 CF
V_2 = V(rem) - V_1
V_2 = 17762 - 6904.3 = 10858 CF
Q_2 = V_2 / T(rem) = 10858 /(19.6 x 3600) = 0.154 CFS
$H(avg)_{BF}$ = 2/3(Elev$_{BF}$ - Elev$_{FF}$)
$H(avg)_{BF}$ = 2/3(954.94 - 953.90) = 0.69 FT
Area of Orifice = Q_2 / (0.62(2gH(avg)$_{BF}$)^0.5) = 0.0372 SF
Area of 1.75" hole = 0.0167 SF
No. of 1.75 " hole(s) = 0.0372 / 0.0167 = 2.23 hole(s)
Therefore, use
TWO(2) 1.75 " hole(s) at Elev. = 953.90

3. 100 yr. Flood:
This basin is designed to pass the 100-year storm event without overtopping the basin.
Flow Required to pass:
Q_A = (0.15 x 3.98 Ac.) = 0.597 CFS
At the required 100-year detention volume elevation, the
THREE(3) 1.00 " hole(s) designed for the first flush and the
TWO(2) 1.75 " hole(s) designed for the bankfull flood will discharge:
Q = 0.62(3 x 0.0055) x (2 x 32.2 x 2.34)^0.5 =
+ 0.62(2 x 0.0167) x (2 x 32.2 x 1.58)^0.5 = 0.3337 CFS
The remaining allowable outflow = 0.597 - 0.3337 = 0.263 CFS
0.62(A)(2 x 32.2 x (955.49 - 954.94) ^0.5 = 0.263 CFS
A = 0.072 SF
Area of 1.75" hole = 0.0167 SF
No. of 1.75 " hole(s) = 0.0717 / 0.0167 = 4.29 hole(s)
Therefore, use
FOUR(4) 1.75 " hole(s) at Elev. = 954.94

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M:\Civil3d_Proj\12088\Site Plan - PC Amend\12088DA1.dwg, 8/31/2020 3:14 PM, Jim Ahnert, None
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260 E. BROWN ST.
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MIKE PARKS
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FOR REFERENCE ONLY

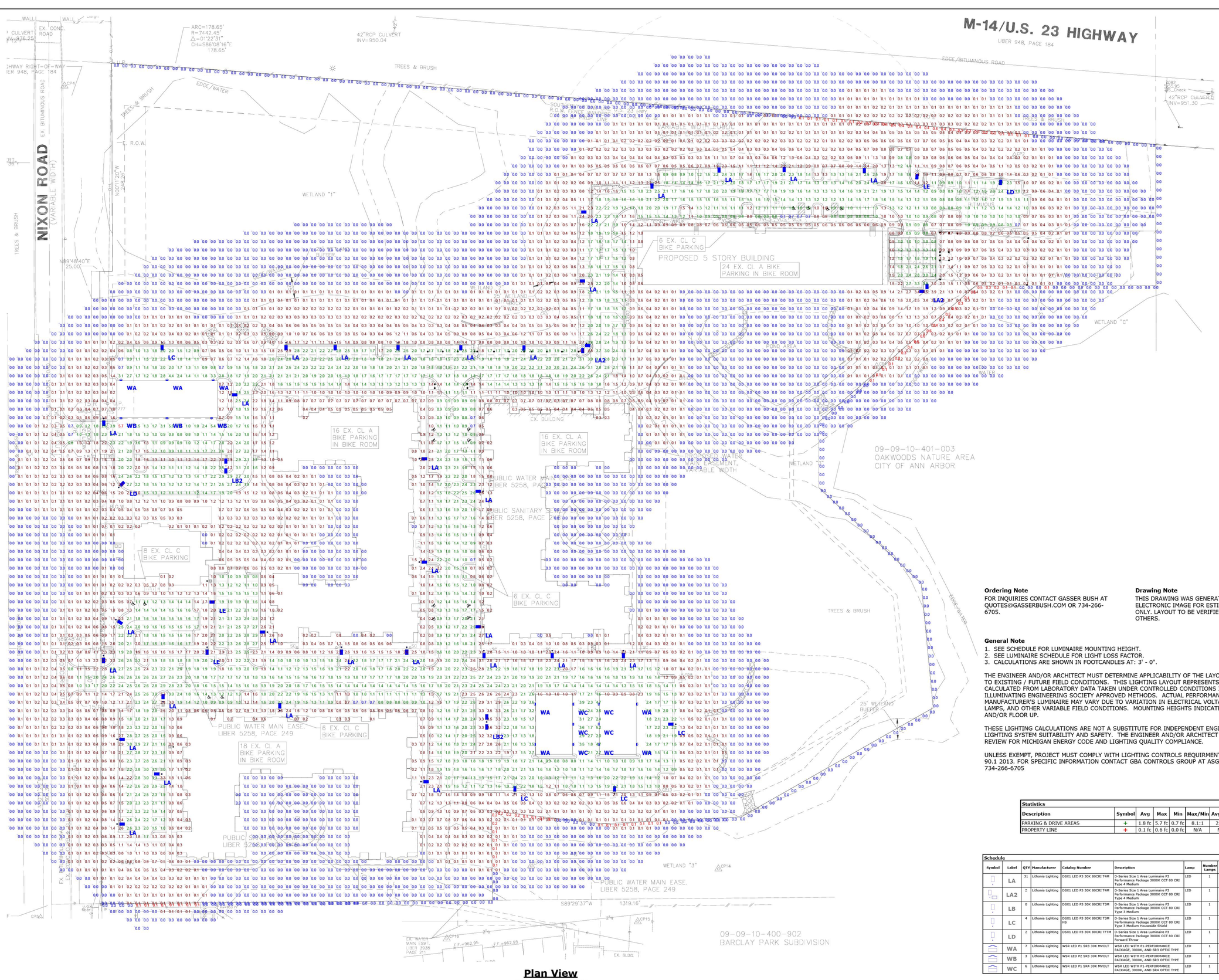
THE ANNEX
AMENDMENT FOR PLANNING COMMISSION
STORMWATER MANAGEMENT PLAN

11

JOB No. 12088
DATE: 07-24-13
SHEET 11 OF 23
CADD:
ENG: JCA
PM: SWB
TECH:
12088DA1.dwg

REVISIONS:	REV. DATE
PER REVIEW COMMENTS	2-06-14
PER REVIEW COMMENTS	5-06-14
PER REVIEW COMMENTS	8-05-14
PER REVIEW COMMENTS	9-09-14
REVISED	7-29-16
REVISED	8-31-16

PER WCWRC 02-22-17
PER CITY REVIEW 02-10-17
ADMINISTRATIVE AMENDMENT 12-29-16
FINAL SUBMITTAL 09-07-16



Plan View
Scale - 1" = 50ft

Ordering Note
FOR INQUIRIES CONTACT GASSER BUSH AT QUOTES@GASSERBUSH.COM OR 734-266-6705.

Drawing Note
THIS DRAWING WAS GENERATED FROM AN ELECTRONIC IMAGE FOR ESTIMATION PURPOSE ONLY. LAYOUT TO BE VERIFIED IN FIELD BY OTHERS.

General Note
1. SEE SCHEDULE FOR LUMINAIRE MOUNTING HEIGHT.
2. SEE LUMINAIRE SCHEDULE FOR LIGHT LOSS FACTOR.
3. CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 3' - 0".

THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING / FUTURE FIELD CONDITIONS. THIS LIGHTING LAYOUT REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER CONTROLLED CONDITIONS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER'S LUMINAIRE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS, AND OTHER VARIABLE FIELD CONDITIONS. MOUNTING HEIGHTS INDICATED ARE FROM GRADE AND/OR FLOOR UP.

THESE LIGHTING CALCULATIONS ARE NOT A SUBSTITUTE FOR INDEPENDENT ENGINEERING ANALYSIS OF LIGHTING SYSTEM SUITABILITY AND SAFETY. THE ENGINEER AND/OR ARCHITECT IS RESPONSIBLE TO REVIEW FOR MICHIGAN ENERGY CODE AND LIGHTING QUALITY COMPLIANCE.

UNLESS EXEMPT, PROJECT MUST COMPLY WITH LIGHTING CONTROLS REQUIRMENTS DEFINED IN ASHRAE 90.1 2013. FOR SPECIFIC INFORMATION CONTACT GBA CONTROLS GROUP AT ASG@GASSERBUSH.COM OR 734-266-6705

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min	Avg/Max
PARKING & DRIVE AREAS	+	1.8 fc	5.7 fc	0.7 fc	8.1:1	2.6:1	0.3:1
PROPERTY LINE	+	0.1 fc	0.6 fc	0.0 fc	N/A	N/A	0.2:1

Schedule

Symbol	Label	QTY	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Lumens per Lamp	LLF	Wattage	Mounting Height
	LA	31	Lithonia Lighting	DSX1 LED P3 30K 80CRI T4M	D-Series Size 1 Area Luminaire P3 Performance Package 3000K CCT 80 CRI Type 4 Medium	LED	1	12167	0.9	102.17	25'-0"
	LA2	2	Lithonia Lighting	DSX1 LED P3 30K 80CRI T4M	D-Series Size 1 Area Luminaire P3 Performance Package 3000K CCT 80 CRI Type 4 Medium	LED	1	12167	0.9	204.34	25'-0"
	LB	0	Lithonia Lighting	DSX1 LED P3 30K 80CRI T3M	D-Series Size 1 Area Luminaire P3 Performance Package 3000K CCT 80 CRI Type 3 Medium	LED	1	11989	0.92	102.17	25'-0"
	LC	4	Lithonia Lighting	DSX1 LED P3 30K 80CRI T3M HS	D-Series Size 1 Area Luminaire P3 Performance Package 3000K CCT 80 CRI Type 3 Medium Houseside Shield	LED	1	10392	0.9	102.1727	25'-0"
	LD	2	Lithonia Lighting	DSX1 LED P3 30K 80CRI TFTM	D-Series Size 1 Area Luminaire P3 Performance Package 3000K CCT 80 CRI Forward Throw	LED	1	12251	0.9	102.17	25'-0"
	WA	7	Lithonia Lighting	WSR LED P1 SR3 30K MVOLT	WSR LED WITH P1-PERFORMANCE PACKAGE, 3000K, AND SR3 OPTIC TYPE	LED	1	2104	0.9	19.56	9'-0"
	WB	3	Lithonia Lighting	WSR LED P2 SR3 30K MVOLT	WSR LED WITH P2-PERFORMANCE PACKAGE, 3000K, AND SR3 OPTIC TYPE	LED	1	2934	0.9	29.17	9'-0"
	WC	6	Lithonia Lighting	WSR LED P1 SR4 30K MVOLT	WSR LED WITH P1-PERFORMANCE PACKAGE, 3000K, AND SR4 OPTIC TYPE	LED	1	2053	0.9	19.56	9'-0"

NIXON ROAD MULTI-FAMILY HOUSING
PHOTOMETRIC SITE PLAN
GASSER BUSH ASSOCIATES
PREPARED FOR: MIDWESTERN CONSULTING
WWW.GASSERBUSH.COM

Designer DP/KB
Date 09/25/2023
Scale Not to Scale
Drawing No. #13-16321-V5
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