MINNEHAHA CREEK
WATERSHED DISTRICT
QUALITY OF WATER, QUALITY OF LIFE

Meeting: Board of Managers
Meeting date: 7/13/2023
Agenda Item #: 10.1
Item type: Permit

Title: Permit 23-215: Amira Development, Victoria, the Heenie Family

Prepared by: Name: Maria Friedges, Permitting Technician
Phone: 952-641-4587
mfriedges@minnehahacreek.org

Recommendation:
Approval of MCWD permit application on the following conditions:

Conditions for permit issuance:

1. Submission of recorded maintenance declaration for Stormwater Management and Wetland Buffers for District approval, then recordation and submission of receipt
2. Submission and MCWD staff approval of a wetland buffer monumentation plan
3. Submission of NPDES permit number and responsible contractor
4. Reimbursement of District fees for engineering and legal review
5. Submission of Financial Assurance for Erosion Control and Stormwater Management
    a. Erosion Control Financial Assurance: $2,500
    b. Stormwater Management Financial Assurance: $10,800

Summary and Background:
Location:
United Properties (Applicant) has applied for a Minnehaha Creek Watershed District (MCWD) permit for the construction of a senior living building, parking lot, trail, and other elements on the property at 2285 Arboretum Boulevard, Victoria.

The property sits in the west of Victoria, outside of the downtown area, in the Six Mile Creek – Halsted Bay subwatershed, and borders the Lake Minnetonka Regional Trail. Located immediately adjacent and north of Six Mile Creek, the project drains to Six Mile Creek through surrounding wetlands before traveling north under Highway 5, ultimately discharging into East Auburn Lake inside Three Rivers Park District's Carver Park Reserve.

Proposed Development and Rule Triggers:
The development (Amira) proposes to subdivide the existing 48.05-acre parcel into three lots. As shown in Attachment A – Site Plans Sheet C1.0 and C2.0, Lot 3 will remain a single-family home; on Lot 2 an existing single-family home will be demolished and rebuilt; and Lot 1 is proposed to be developed into a 145-unit senior living apartment building.

The proposed project triggers MCWD's Erosion Control, Stormwater Management, and Wetland Protection rules. The project meets the requirements for Erosion Control and Stormwater Management. The Applicant has requested the Board consider granting an exception to the Wetland Protection rule section 6(c) – buffer width and averaging.

Request for Exception to Wetland Protection Rule:
Wetlands and Wetland Buffer Requirements:
The subject parcel contains delineated wetlands that are fringe to Six Mile Creek. A 30.51-acre type 2, 3, 4 wetland, part of a larger 59-acre system that surrounds Six Mile Creek, is identified in the May 3rd, 2023, delineation report on the property, and MCWD's Functional Assessment of Wetlands, as having a Preserve management classification. Pursuant to MCWD's Wetland Protection Rule, wetlands with this management classification require wetland buffers of 75 feet.

Applicants may adjust this buffer width down to a minimum applied width of 67 feet based on factors of slope and soil condition. Based on the site factors, this site requires a base buffer width of 75 feet. Buffer width may vary down to 50% based on other demonstrated site constraints, as long as there is no reduction in total buffer area. When averaging buffers in this way, any part of the buffer exceeding 200% of the applied buffer width is excluded.

Wetland Buffer Exception Request:
Through early engagement with MCWD in the proposed project, United Properties adjusted the site plan to eliminate any proposed direct wetland impacts with this project. This also had the effect of reducing the amount of wetland buffer impacts initially proposed.

However, due to spatial constraints associated with the proposed use of the property, the Applicant is seeking an exception to the Wetland Buffer requirements in three discrete areas where minimum wetland buffer widths are not met, and to the total average square feet of wetland buffer required (Site Plans Sheet C2.5).
The Board is being asked to consider an exception to these wetland buffer requirements on the basis that the Applicant is proposing to offset the lost function and value of the impacted wetland buffer.

The applicant proposes to achieve this offset by providing stormwater management greater than what is required under the stormwater management rule and by providing an enhanced planting plan that includes additional tree, shrub, and sedge plugs that will increase the diversity of riparian terrestrial habitat of the buffer area, provide increased shading to aquatic habitat, and support stabilization of the wetland edges and surrounding slopes.

In accordance with Section 5 of the Exceptions Rule, the Board of Managers may grant an exception from a particular rule provision on a determination that the proposed application, with such further considerations as the Board may impose, will achieve a greater degree of water resource protection than would strict compliance with the provision.

District Rule Analysis:
Erosion Control Rule
MCWD's Erosion Control rule applies to a land disturbance of 5,000 square feet or the excavation, fill, or stockpiling on-site of 50 cubic yards of soil or earth material. The Applicant is proposing 7.6 acres of disturbance and 13,500 cubic yards of excavation volume; therefore, the rule is triggered.

Per sections 5(a) and 5(b) of the rule, an erosion and sediment control plan has been submitted and displays erosion and sediment control best management practices.

Site Plan Sheets SW1.0 – 1.5 contain stormwater pollution prevention plan narratives, plans, details, and inspection requirements. Site sediment and erosion control practices include a rock construction entrance to prevent sediment tracking off-site, silt fence and bio-rolls down gradient of disturbed areas, double silt fence at construction limits around wetlands, ditch checks, inlet protection devices for catch basins that are part of the site's storm sewer network, erosion control blanket on all slopes 4:1 or steeper, and permanent stabilization for disturbed areas.

Staff find the erosion and sediment control rule requirements have been met.

Per Section 8 of the rule, a financial assurance is required and will be satisfied in the form of a performance bond, a letter of credit, or cash escrow, listed as a condition of approval.

Stormwater Management Rule
The District's Stormwater Management Rule is applied to projects that propose to create or replace impervious surface and requires applicants to submit for approval a stormwater management plan.

Stormwater management requirements are based on site size, percent site disturbance, and change in impervious cover.

Since there are existing structures and impervious cover, the site is qualified as a redevelopment. The project proposes redevelopment on a parcel greater than one acre, with 7.6 acres of disturbance on a 40.8 acre site (less than 40% disturbance), and an increase in impervious surface from 0.38 acres to 3.42 acres (more than a 50% increase).

Therefore, per Section 5 (b) – Redevelopment Requirements for Increased Impervious Surface, the project is required to show no net increase in peak runoff rates from the site for the 1, 10 and 100 year design storms, volume control in an amount equivalent to the first one inch of runoff from the site's impervious cove, and phosphorus control in an amount equivalent to what is achieved by providing volume control.

The entirety of proposed sidewalk segments (approximately 0.3 acres) are exempt pursuant to Section 2d (2) - *construction of sidewalk and trail that will not exceed 12 feet in width and will be bordered on the downgradient side(s) of a pervious buffer averaging at least one-half the width of the sidewalk or trail*. The proposed sidewalk is six feet and provides, at minimum, three-foot-width buffers. This reduces the regulated impervious cover to 3.12 acres.

Per Section 3(c)(1) *credit toward compliance with the one inch volume control standard will be calculated using industry standard hydrologic models and Appendix A: Volume Abstraction Credit Schedule.* Where site soils exist as a constraint to standard infiltration, Appendix A provides filtration may be provided at 50% credit.

Given the suitability of site soils, the Applicant has proposed to meet volume control through filtration, using an underground detention system with a proprietary filter, and a surface filtration basin. The District Engineer has reviewed the proposed plans, stormwater models, and stormwater calculations and determined that the system has been sized to meet the volume control, rate control, and phosphorus control requirements of the Stormwater Management Rule.

Table 1. Volume Control Summary

Subwatershed	Non-Exempt Impervious Area (ac)	Exempt Impervious Area (ac)	Total Impervious Area (ac)	*Required Volume Control (cf)	Provided Volume Control (cf)
PR1A	2.72	0.06	2.78	19,770	21,516
PR1B	0.21	0.02	0.23	1,544	2,052
PR1C	0.19	0.21	0.4	1,360	0
PR2	0	0	0	0	0
TOTAL	**3.12**	0.29	3.41	**22,674**	**23,568**

**Required volume control is based on non-exempt impervious only*

Table 2. Rate Control Summary

Location	Storm Size	Existing (cfs)	Proposed (cfs)
Overall	1-yr	10.33	7.35
	10-yr	25.92	19.05
	100-yr	55.70	51.87
To Wetland (South)	1-yr	9.91	6.94
	10-yr	24.85	18.00
	100-yr	53.39	49.60
To Highway 5 (North)	1-yr	0.42	0.41
	10-yr	1.07	1.05
	100-yr	2.31	2.27

Section 3(c)(2) of the rule does not apply, as the Applicant is able to provide abstraction of the first one inch of rainfall. Section 3(c)(3) of the rule does not apply as the receiving area for runoff is not landlocked.

Section 3(d) of the rule does not apply as the Applicant is required to treat the entire site's impervious surface.

Per section 3(e) of the rule, the project shall provide at least two vertical feet of separation between the 100-year flood elevation and the low openings to structures. Based on the Applicant's submittals, and review and analysis by staff and

the District Engineer, two feet of vertical separation has been provided between the low opening of structures and 100-year high water levels of stormwater facilities.

Section 7 of the rule does not apply as the Applicant does not propose using a regional stormwater facility for treatment.

Section 8(a) of the rule does not apply as the project does not propose a new point source or change in the runout control elevation of any waterbody.

Per section 8(b) of the rule, no activity subject to the rule may alter a site so as to increase the bounce in water level, period of inundation, or runout control elevation of any downstream lake or wetland, for the one-, 10- and 100-year events, beyond that specified in Table 1 of the rule. Based on the Applicant's submittals, and review and analysis by staff and the District Engineer, there will be no bounce in the receiving wetland during the 100-year storm, within modeling error, which conforms to Table 1. The project as proposed is in conformance with the downstream waterbody requirements of the rule.

Per section 9 of the rule, the maintenance requirement of stormwater facilities will be satisfied through the recordation of a maintenance declaration, listed as a condition of approval.

The project as proposed, upon fulfillment of the recommended condition, meets the requirements of the Stormwater Management Rule.

<u>Wetland Protection Rule</u>
A 30.51-acre type 2, 3, 4 wetland is identified on the subject parcel in the May 3rd, 2023, delineation report, and MCWD's Functional Assessment of Wetlands, as having a Preserve management classification. The wetland is fringe to Six Mile Creek which discharges into East Auburn Lake.

The proposed work will not involve any filling, draining, or excavation of wetland, and so Section 3 – Wetland Replacement and Section 4 – Excavation, do not apply.

The vegetated buffer requirements of Sections 5, 6, and 7 apply if the work requires a permit under the Stormwater Management or Waterbody Crossings & Structures rule. As a permit is required under the Stormwater Management rule, the buffer requirement applies.

Per section 5(a) of the Wetland Protection rule, buffers must be provided on wetland edge downgradient of the proposed disturbance. The construction of a residential apartment building is considered to be a disturbance and the Applicant has provided plans for a vegetated buffer around the boundary of the wetland that is within the property and downgradient of site disturbance. Additional analysis on buffer width has been provided under section 6(c) below.

Per section 5(b) of the rule, buffer is required of a width as set forth in section 6, which is reviewed below.

Per section 5(c) of the rule, buffers must be documented by a declaration or other recordable instrument. Submission of a maintenance declaration is listed as a recommended condition of approval to satisfy this requirement.

Section 5(d) of the rule requires a permanent wetland buffer monument to be installed at each lot line where it intersects the buffer, and where needed to indicate the contour of the buffer, with a maximum spacing of 100 feet. Submission of a wetland buffer monument plan that is in accordance with the rule is listed as a recommended condition of approval to satisfy this requirement, provided that the exception to the minimum wetland buffer width requirement is granted.

Per section 6(a) of the rule, buffer width requirements are determined by the management class of the wetland. A delineation and MNRAM classify the wetlands downgradient of the disturbance as Preserve management class, which corresponds to a 75-foot base buffer width.

Section 6(b) of the rule does not apply, as the Applicant has not requested a reduction for beneficial slope or soil conditions.

Section 6(c) of the rule, buffer averaging is permitted should the full width of the buffer not be able to be provided in all locations. Under this provision of the rule, for a buffer on a Preserve wetland, the buffer width may range from a minimum width of 37.5 feet (50%) to a maximum width of 150 feet (200%), provided that there is no reduction in total buffer area (assumes an equal area to a uniform 75-foot buffer along the length of the wetland).

Based on review of the plans and specifications, the Applicant is not able to provide the required buffer area for the wetland and the plan does not meet the required MCWD minimum buffer width requirement at all locations on the edges of the wetland that are within the property boundary. The Applicant has requested an Exception from compliance with section 6(c) of the Wetland Protection rule, which has been analyzed under the Exception criteria below.

The Applicant's plans indicate several locations where the minimum buffer width is not provided due to the location of the proposed building and surrounding sidewalk.

Shown on Site Plan Sheet C2.5, there are three segments within the project that do not meet the minimum buffer width and contribute to a shortfall in total buffer area.

Table 4 and Table 5 below summarize the shortfalls from the required minimum buffer width and required area for all four segments of the Preserve wetland. At the three segments, the buffer width is short of the required 37.5' minimum by 18.8', 10.8' and 18.6 feet at segments 1, 2 and 3 respectively. Out of a total required buffer area of 146,621 square feet, the proposed site plan is short 16,940 square feet.

Table 4. Buffer Width Provided and Shortfall per Segment

Segment	Linear Feet of Segment (ft)	Buffer Width Provided (ft)	Shortfall from Required Minimum Buffer Width of 37.5 (ft)
1	116	18.7	**18.8**
2	109	26.7	**10.8**
3	75	18.9	**18.6**

Table 5. Wetland Management Classification and Associated Buffer Requirements

Wetland	Size of Wetland (ac)	Management Class	Base Buffer Width	Required Minimum Buffer Width	Required Buffer Area	Provided Buffer Area	Linear Feet Not Meeting Minimum Buffer Width Requirement (ft)	Area of Minimum Buffer Width Not Met (sf)
1	30.51	Preserve	75'	37.5'	148,621 sf	131,681 sf	300	**16,940**

Section 6(d) of the rule does not apply, as the Applicant has not requested a reduction in base buffer width.

Section 6(e) of the rule does not apply, because the project is not a Linear Reconstruction Project.

Section 6(f) of the rule does not apply as this project is not construction of a New Principal Residential Structure.

The criteria of section 7(a) of the Wetland Protection rule, which prohibits actions such as mowing, fertilizing, or placement of yard waste within the buffer area, are memorialized by means of the maintenance declaration. Submission of a maintenance declaration including these provisions is listed as a recommended condition of approval.

Section 7(b) of the rule does not apply as the site is not public land, a homeowner's association property, or public right-of-way.

Per section 7(c), buffer areas that are not vegetated or will be disturbed by grading or other site activities during construction shall be replanted and maintained according to the specific standards. Staff have reviewed the proposed project and have determined that the plans do not provide for the area of the proposed buffer to be disturbed during construction and there is an existing vegetated buffer, therefore the specific site standards of the rule are not applicable.

In summary, upon satisfaction of the recommended conditions, the project meets the requirements of the Wetland Protection Rule, apart from section 6(c), as noted above, for which the Applicant has requested an Exception.

Exception Request:

Wetland Buffer Requirements:

The Variance and Exception Rule allows the Board of Managers to grant an exception from a provision of the rules on a determination that the proposed application will achieve a greater degree of water resource protection than strict compliance with the provision. The Application has requested an exception from the buffer minimum width and total area provisions of section 6(c) of the Wetland Protection Rule.

The Applicant's Site Plan Sheet C2.5 indicate several locations where the minimum buffer width is not provided due to the location of the proposed building and surrounding sidewalk. At the three segments, the buffer width is short of the required 37.5' minimum by 18.8', 10.8' and 18.6 feet at segments 1, 2 and 3 respectively. Out of a total required buffer area of 146,621 square feet, the proposed site plan is short 16,940 square feet.

Applicant's Exception Proposal:

To support the request for an exception, the Applicant has provided a detailed exception application.

The basis of the exception application is that the Applicant proposes to offset the lost habitat and stormwater management functions of the buffer shortfall through an enhanced planting plan of the buffer, and stormwater management in an amount that exceeds what is required by the rule.

The wetland buffer planting plan utilizes a Mesic Prairie seed mix (MNDOT Mix 35-241) which will be protected by hydro-mulching or erosion control blanket. In terms of an enhanced planting plan, the Applicant is proposing to go beyond the minimum requirement to re-seed and stabilize the wetland buffer, by installing 1,249 live sedge plant plugs, a mix of 58 Redosier Dogwood and High Bush Cranberry shrubs, seven ornamental trees of various species, 12 Eastern Larch evergreen trees, and 50 deciduous trees of various species. The plugs will be provided throughout the buffer but focused in areas adjacent to the reduced buffer width along the wetland and in an area equal to or larger than the area where the buffer is less than the required minimum width. Additional shrub and tree plantings will also be provided throughout the buffer area, including shrubs and trees that bring vertical structure, songbird nesting, terrestrial habitat, shaded aquatic habitat, fruit as a food source, and pollinator habitat. While cost is not a consideration in determining if exception criteria is met, the delta in price between a seeding plan and the proposed planting plan is approximately $40,943.

In addition to enhanced buffer planting plans, the Applicant has provided a plan to provide more water quality benefit that would otherwise be provided by the approximate 11% shortfall in wetland buffer.

The Applicant has proposed the addition of a proprietary cartridge filter to receive and treat water from the underground storage device. The proprietary filtration device will collect both particulate and dissolved Phosphorous, providing enhanced phosphorus reduction from the site before being discharged to Six Mile Creek and East Auburn Lake.

A standard design of this stormwater management system would have encompassed using a sand filter to receive water from the underground detention system. MCWD's Engineer estimates that a standard sand filter would achieve 1.3 lb./year total phosphorous (TP) reduction. Whereas the proprietary cartridge filter is estimated to achieve 2.5 lb./year TP reduction. An increase of 1.2 lbs./year will be provided through this design choice, approximately 90% more than would be required by the stormwater management rule.

Exception Analysis:
Wetland buffers are required principally to provide habitat, shading, filtration of runoff, and a physical setback in critical transition zones between terrestrial and aquatic zones.

The Applicant's exception proposal has been reviewed by staff and the District Engineer, to assess whether the proposed plan will provide greater ecological integrity within the buffer and greater water quality benefit, than would strict compliance with the rule.

Ecological Integrity:
With regards to overall ecological integrity, all three segments of the proposed buffer width shortfall are adjacent to impervious cover and under a standard planting plan may have provided limited ecological lift. In contrast, the proposed plan includes 1,249 live sedge plant plugs, a mix of 58 Redosier Dogwood and High Bush Cranberry shrubs, seven ornamental trees of various species like Serviceberry, Hawthorn, and Hophornbeam, 12 Eastern Larch evergreen trees, and 50 deciduous trees of various species like Black Maple, Burr Oak, River Birch others.

Sedges are cool-season plants that extend the growing season of the buffer, providing water transpiration in the spring when warm-season grasses are dormant and vegetation cover and erosion prevention during spring rainstorms. Sedges in the buffer and in proximity to the wetland edge will increase biomass production including more roots, plant material above ground, and different plants growing throughout the growing season.

The trees and shrubs will provide physical habitat structure, not found in a typical seeded buffer, and the root systems of these plant species will promote increased infiltration, soil stabilization, evapotranspiration, shading, and carbon sequestration.

Overall, increasing the diversity of native species within a planted buffer will increase its resilience to environmental stressors, and reduce the occurrence of non-native invasive species that may require chemical treatments, human impact, or maintenance disturbance.

On this basis, staff finds that the proposed planting plan will increase the volume and diversity of plant composition within the wetland buffer, beyond that which would be achieved through a standard seeding plan required under the rule.

Stormwater Function:
Stormwater functions that may have been provided by the 16,940 square foot wetland buffer shortfall have been evaluated against the supplemental water quality treatment being provided by the addition of a cartridge filter to provide secondary treatment for runoff leaving the underground detention facility.

In consultation with the District Engineer, staff have found that the additional 1.2 lbs./year of total phosphorus reduction being provided will exceed the water quality that would have been provided by the lost square footage of wetland buffer, in an area that is tributary to Six Mile Creek and East Auburn Lake.

Summary:
The Applicant has applied for a Minnehaha Creek Watershed District permit for Erosion Control, Stormwater Management, and Wetland Protection rules, and an Exception to providing the required minimum buffer width and area.

Staff and the District Engineer have evaluated the exception to the wetland buffer provisions looking at the replaced ecological and water quality functions of the proposal and find that the Applicant has provided sufficient evidence that the proposed project will achieve a greater degree of water resource protection than would strict compliance with the minimum buffer width and total buffer area requirement per sections 6(a) and 6(c) of the Wetland Protection Rule.

Therefore, staff recommends approval of the permit application with the conditions listed at the beginning of the report.

Attachments:

A. Exception Application
B. Site Plans
C. Stormwater Management Report
D. Wetland Buffer Plan

REQUEST FOR EXCEPTION FROM A RULE PROVISION

MINNEHAHA CREEK WATERSHED DISTRICT (MCWD)
15320 MINNETONKA BLVD. **Phone: 952-471-0590**
MINNETONKA, MN 55345 **Fax: 952-471-0682**

A request for an exception must be accompanied by a MCWD Water Resources Application

Project Details:

Project address: 2285 Arboretum Blvd. City: Victoria State: MN Zip: 55386

County: Carver Property ID number (PID): 650143310

The Board of Managers may grant an exception from a provision of the rules on a determination that the proposed application will achieve a greater degree of water resource protection than would strict compliance with the provision. An exception must be approved by a two-thirds majority of managers voting.

Exception Requested From MCWD Rule(s):

- ☐ Erosion Control
- ☐ Floodplain Alteration
- ☒ Wetland Protection
- ☐ Shoreline & Streambank Stabilization
- ☐ Waterbody Crossings & Structures
- ☐ Stormwater Management
- ☐ Appropriations
- ☐ Illicit Discharge

Provision(s) and Requirement(s) of the Rule(s):

Wetland Protection Rule 6.(a): Preserve Wetland requires an average buffer width of 75 ft and minimum buffer width of 37.5 ft. Wetland buffer must be provided on that part of the wetland edge that is downgradient from the activity or construction and around each wetland that will be disturbed.

Requested Exception:

75 ft average buffer area = 148,621 sqft. Provided Buffer area = 131,681 sqft. Min width=18.7 ft

We are proposing enhanced landscape plantings, additional stormwater treatment and a five-year wetland buffer maintenance plant to achieve increased protection and benefits, above the base rule requirement to compensate for the reduced wetland buffer area.

Describe how the proposed design will achieve a greater degree of water resource protection than strict compliance with the provision, referring to the impacts on water quality, water quantity, and ecological integrity. Quantify water resource protection as much as possible (pounds of pollutant removal, acres of habitat creation, etc).

Enhanced Landscape Plantings: Will strengthen the buffer, provide terrestrial habitat for native wildlife, and remove excess nutrients.
Enhanced Stormwater Treatment: A Stormfilter with Phosphosorb media will treat a majority of the site and impervious area with enhanced dissolved phosphorus removal via chemical mechanisms.
Monitoring & Establishment: Make sure the provided wetland buffer contains little to no bare soil and a dominance of native vegetation to provide maximum value to the protection.
See attached Memo for additional details.

Memorandum

TO: Kayla Westerlund
Permit Program Manager – Minnehaha Creek Watershed District
15320 Minnetonka Blvd.
Minnetonka, MN 55345

FROM: David Knaeble
Civil Site Group

DATE: 6/29/23

RE: Amira Victoria – Wetland Buffer Exception Narrative

Dear Kayla,

As part of the Amira Development project we are working on in the City of Victoria in the southeast corner of Highway 5 and Lakes Parkway we need to request an "Exception" from the Minnehaha Creek Watershed District (MCWD) regarding wetland buffer width and wetland buffer area.

The proposed project is the construction of a new apartment building, parking lot, stormwater management system and landscaping adjacent to an existing wetland. The existing wetland has been classified as a "Preserve" wetland, which is the highest classification and comes with the widest buffer requirements.

We have been working with you at the MCWD to come up with a site plan that minimizes any potential wetland impacts and provides the greatest wetland buffer, but still meets the requirements of the development. Original site and architectural plans would have required wetland impacts and mitigation but have been revised to avoid wetland impacts.

The MCWD rules regarding wetland buffer width and area are as follows:

<u>PRESERVE WETLAND REQUIREMENTS</u>
Base Buffer Width = 75 feet
Min. Buffer Width = 37.5 feet

Required Buffer Area (75 feet Average) = 148,621 sf

The proposed project will need to request an "Exception" from these MCWD rules regarding minimum buffer width and required buffer area. We are proposing to provide additional wetland buffer resources and additional stormwater management to show that the proposed buffer will achieve a greater degree of water resource protection than would strict compliance with the provision of the rules.

<u>PROVIDED BUFFER</u>
Provided Buffer Area = 131,681 sf
Min. Buffer Width = 18.7 feet (There are three small areas where our buffer width is less than 37.5 feet, see the Wetland Buffer Plan sheet C2.5 for these areas)

The wetland buffer as currently designed is not intended to provide significant water quality treatment for the new impervious areas on site. All the new impervious areas onsite (with the exception of the trail around the perimeter of the building and runoff from the single-family houses) are to be routed to the proposed stormwater system that will be designed and constructed as part of this project. The wetland buffer will only provide treatment for the water that falls on the buffer itself and for minor landscaped areas between the buffer edge and the proposed building, and for portions of the two new single-family houses.

To mitigate for the reduced buffer area and encroachment into the minimum buffer width, we will be providing enhanced landscape plantings, additional stormwater treatment and a five-year wetland buffer maintenance plan to achieve increased protection and benefits, above the base rule requirement, to the adjacent wetland complex, Minnehaha Creek and downstream water resources.

ENHANCED LANDSCAPE PLANTINGS

The traditional wetland buffer plantings that will be utilized for this site will be a Mesic Prairie seed mix (MNDOT Mix 35-241). This seed mix will be protected by either hydro-mulching or erosion control blanket. To mitigate for the areas where the buffer areas are less than the 37.5 feet minimum, we are proposing to install enhanced landscape plantings with the use of live sedge plant plugs and shrubs. The plugs will be provided throughout the buffer, but focused in areas adjacent to the reduced buffer width along the wetland edge and in an area equal to or larger than the area where the buffer is less than the minimum. Additional shrub plantings will be provided throughout the buffer area also, which will include Red Osier Dogwood and High Bush Cranberry, which will bring vertical structure, provide songbird nesting and berries as a food source.

Sedges are cool season plants that extend the growing season of the buffer, providing transpiration of water in the spring when warm season grasses are still dormant. Sedges in the buffer in proximity to the wetland edge will increase biomass production, resulting in more roots in the ground, plant material above ground, and different plants growing throughout the growing season. The sedge plantings will provide additional buffer function that makes up for a reduction in the buffer width.

The proposed buffer planting of diverse native seed mix, plugs and shrubs will exceed the base rule requirement by providing terrestrial habitat, protecting the wetland edge and offering plant diversity for pollinators, song-birds, reptiles and other species foraging, nesting or loafing. A buffer containing high-quality, native, diverse vegetive species directly correlates to pleasing aesthetic views of flora and fauna. In addition, establishing native vegetation reduces the occurrence of undesirable non-native, invasive species which may require maintenance disturbance or chemical treatments.

The vegetation and soils of natural buffer areas help remove excess nutrients from surface runoff. These nutrients act as fertilizer, however, too much fertilizer can cause lots of damage to the wetland and downstream water resources. An enhanced buffer planting can absorb excessive phosphorus and nitrogen that otherwise might overwhelm the wetland.

ENHANCED STORMWATER TREATMENT

The proposed buffer area is not going to be treating any significant runoff from impervious areas. The majority of the site, including the proposed building and parking lot area, will be routed to a proposed underground detention system with a proprietary filtration device, which will provide the required water quality treatment and abstraction volume for the site. The buffer area will only be treating the runoff and

rainfall from the area of the buffer itself and small portions of landscape area adjacent to the buffer. There will not be significant TSS or TP loading in the subcatchments that are routed through the buffer or significant TSS or TP treatment provided by the buffer itself. With that info, the current site design does need to meet the minimum buffer area requirements of the watershed. To mitigate for the reduced buffer area, we are proposing to provide additional stormwater management equal to the percentage of buffer area that we are less than existing.

Provided Buffer Area = 131,681 sf
Required Buffer Area = 148,621 sf

Percentage of Buffer Area Provided = 88.6%

As part of the final stormwater design, we have provided at least 11.4% additional water quality treatment in the form of additional TP removal by utilizing a proprietary filtration device in lieu of an underground sand filter. This design is shown in the stormwater report for this site.

The increased water quality treatment will more than mitigate for the lost wetland buffer area and the functional benefit provided by the buffer.

MONITORING AND ESTABLISHMENT

The final component we will be providing as part of the “Exception” request is that the project will include a Wetland Buffer Maintenance Plan that will describe the schedule of establishment and maintenance activities for the first five-years of establishment; describe potential invasive species and the steps to control spread; and describe inspection methods and schedule for monitoring. The project owner will contract with a native vegetation establishment and maintenance company to provide knowledgeable, experienced, wetland buffer maintenance as necessary during the establishment period to make sure the provided wetland buffer establishes to contain little to no bare soil and a dominance of native vegetation to provide maximum value to the protection of Minnehaha Creek.

Based on the measures mentioned above, we feel that the wetland buffer will achieve a greater degree of water resource protection than would strict compliance with the provision of the rules and that an “Exception” to the MCWD should be granted. Please review this memo and let us know if the MCWD staff would support this request.

Sincerely,
David Knaeble
Civil Site Group
763-234-7523

AMIRA VICTORIA

VICTORIA, MINNESOTA

ISSUED FOR: CITY SUBMITTAL

SITE LOCATION MAP

PROJECT CONTACTS		
	NAME & ADDRESS	CONTACT
CIVIL ENGINEER	CIVIL SITE GROUP 5000 GLENWOOD AVE GOLDEN VALLEY, MN 55422	DAVID KNAEBLE 612-615-0060 DKNAEBLE@CIVILSITEGROUP.COM
LANDSCAPE ARCHITECT	CIVIL SITE GROUP 5000 GLENWOOD AVE GOLDEN VALLEY, MN 55422	PAT SARVER 612-615-0060 PSARVER@CIVILSITEGROUP.COM
DEVELOPER	UNITED PROPERTIES 250 NICOLLET MALL, SUITE 500 MINNEAPOLIS, MN 55401	DAVE YOUNG 952-835-5300
PROPERTY OWNER	UNITED PROPERTIES 250 NICOLLET MALL, SUITE 500 MINNEAPOLIS, MN 55401	DAVE YOUNG 952-835-5300
ARCHITECT	MOMENTUM DESIGN GROUP 755 PRIOR AVENUE N, #301A ST. PAUL, MN 55104	BRIAN GADIENT 952-593-9788
SURVEYOR	E.G. RUD & SONS, IN. 6776 LAKE DRIVE NE, SUITE 110 LINO LAKES, MN 55014	KEVIN C. MCCAIN 6151-361-8200
GEOTECHNICAL ENGINEER	BRAUN INTERTEC 11001 HAMPSHIRE AVE S MINNEAPOLIS, MN 55348	NATHAN MCKINNEY 952-995-2000

ALL EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTACT "GOPHER STATE ONE CALL" (651-454-0002 OR 800-252-1166) FOR UTILITY LOCATIONS, 48 HOURS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY UTILITIES THAT ARE DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

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

SHEET INDEX

SHEET NUMBER	SHEET TITLE
C0.0	TITLE SHEET
C0.1	PROJECT NOTES
C0.2	CITY OF VICTORIA STANDARD PLAN NOTES
C1.0	REMOVALS PLAN
C1.1	REMOVALS PLAN WEST
C1.2	REMOVALS PLAN NORTHEAST
C1.3	REMOVALS PLAN SOUTHWEST
C1.4	TREE PRESERVATION PLAN
C1.5	TREE PRESERVATION PLAN: TREE LIST AND REQUIREMENTS
C2.0	SITE PLAN OVERALL
C2.1	SITE PLAN WEST
C2.2	SITE PLAN NORTHEAST
C2.3	SITE PLAN SOUTHEAST
C2.4	TURNING MOVEMENT AND HYDRANT SPACING PLAN
C2.5	WETLAND BUFFER PLAN
C3.0	GRADING PLAN OVERALL
C3.1	GRADING PLAN WEST
C3.2	GRADING PLAN NORTHEAST
C3.3	GRADING PLAN SOUTHEAST
C4.0	UTILITY PLAN OVERALL
C4.1	UTILITY PLAN WEST
C4.2	UTILITY PLAN NORTHEAST
C4.3	UTILITY PLAN SOUTHEAST
C5.0	CIVIL DETAILS
C5.1	CIVIL DETAILS
C5.2	CIVIL DETAILS
C5.3	CIVIL DETAILS
C5.4	CIVIL DETAILS
L1.0	LANDSCAPE PLAN OVERALL
L1.1	LANDSCAPE PLAN WEST
L1.2	LANDSCAPE PLAN NORTHEAST
L1.3	LANDSCAPE PLAN SOUTHEAST
L1.4	LANDSCAPE PLAN NOTES & DETAILS
SW1.0	SWPPP - EXISTING CONDITIONS
SW1.1	SWPPP - PROPOSED CONDITIONS
SW1.2	SWPPP - DETAILS
SW1.3	SWPPP - NARRATIVE
SW1.4	SWPPP - ATTACHMENTS
SW1.5	SWPPP - ATTACHMENTS

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

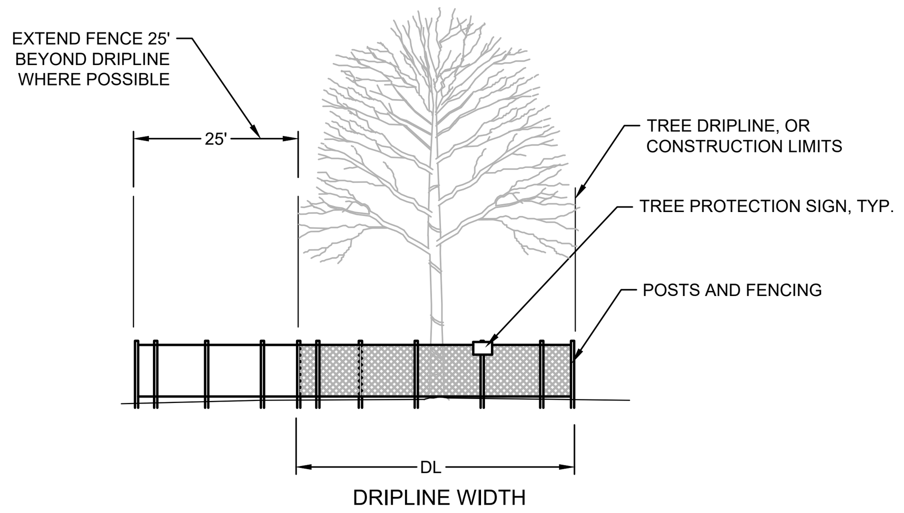
TITLE SHEET

C0.0

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

REMOVAL NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTACT "GOPHER STATE ONE CALL" (651-454-0002 OR 800-252-1166) FOR UTILITY LOCATIONS, 48 HOURS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY UTILITIES THAT ARE DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.
2. SEE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) PLAN FOR CONSTRUCTION STORM WATER MANAGEMENT PLAN.
3. REMOVAL OF MATERIALS NOTED ON THE DRAWINGS SHALL BE IN ACCORDANCE WITH MNDOT, STATE AND LOCAL REGULATIONS.
4. REMOVAL OF PRIVATE UTILITIES SHALL BE COORDINATED WITH UTILITY OWNER PRIOR TO CONSTRUCTION ACTIVITIES.
5. EXISTING PAVEMENTS SHALL BE SAWCUT IN LOCATIONS AS SHOWN ON THE DRAWINGS OR THE NEAREST JOINT FOR PROPOSED PAVEMENT CONNECTIONS.
6. REMOVED MATERIALS SHALL BE DISPOSED OF TO A LEGAL OFF-SITE LOCATION AND IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS.
7. ABANDON, REMOVAL, CONNECTION, AND PROTECTION NOTES SHOWN ON THE DRAWINGS ARE APPROXIMATE. COORDINATE WITH PROPOSED PLANS.
8. EXISTING ON-SITE FEATURES NOT NOTED FOR REMOVAL SHALL BE PROTECTED THROUGHOUT THE DURATION OF THE CONTRACT.
9. PROPERTY LINES SHALL BE CONSIDERED GENERAL CONSTRUCTION LIMITS UNLESS OTHERWISE NOTED ON THE DRAWINGS. WORK WITHIN THE GENERAL CONSTRUCTION LIMITS SHALL INCLUDE STAGING, DEMOLITION AND CLEAN-UP OPERATIONS AS WELL AS CONSTRUCTION SHOWN ON THE DRAWINGS.
10. MINOR WORK OUTSIDE OF THE GENERAL CONSTRUCTION LIMITS SHALL BE ALLOWED AS SHOWN ON THE PLAN AND PER CITY REQUIREMENTS. FOR ANY WORK ON ADJACENT PRIVATE PROPERTY, THE CONTRACTOR SHALL OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNER PRIOR TO ANY WORK.
11. DAMAGE BEYOND THE PROPERTY LIMITS CAUSED BY CONSTRUCTION ACTIVITY SHALL BE REPAIRED IN A MANNER APPROVED BY THE ENGINEER/LANDSCAPE ARCHITECT OR IN ACCORDANCE WITH THE CITY.
12. PROPOSED WORK (BUILDING AND CIVIL) SHALL NOT DISTURB EXISTING UTILITIES UNLESS OTHERWISE SHOWN ON THE DRAWINGS AND APPROVED BY THE CITY PRIOR TO CONSTRUCTION.
13. SITE SECURITY MAY BE NECESSARY AND PROVIDED IN A MANNER TO PROHIBIT VANDALISM, AND THEFT, DURING AND AFTER NORMAL WORK HOURS, THROUGHOUT THE DURATION OF THE CONTRACT. SECURITY MATERIALS SHALL BE IN ACCORDANCE WITH THE CITY.
14. VEHICULAR ACCESS TO THE SITE SHALL BE MAINTAINED FOR DELIVERY AND INSPECTION ACCESS DURING NORMAL OPERATING HOURS. AT NO POINT THROUGHOUT THE DURATION OF THE CONTRACT SHALL CIRCULATION OF ADJACENT STREETS BE BLOCKED WITHOUT APPROVAL BY THE CITY PRIOR TO CONSTRUCTION ACTIVITIES.
15. ALL TRAFFIC CONTROLS SHALL BE PROVIDED AND ESTABLISHED PER THE REQUIREMENTS OF THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MMUTCD) AND THE CITY. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, SIGNAGE, BARRICADES, FLASHERS, AND FLAGGERS AS NEEDED. ALL PUBLIC STREETS SHALL REMAIN OPEN TO TRAFFIC AT ALL TIMES. NO ROAD CLOSURES SHALL BE PERMITTED WITHOUT APPROVAL BY THE CITY.
16. SHORING FOR BUILDING EXCAVATION MAY BE USED AT THE DISCRETION OF THE CONTRACTOR AND AS APPROVED BY THE OWNERS REPRESENTATIVE AND THE CITY PRIOR TO CONSTRUCTION ACTIVITIES.
17. STAGING, DEMOLITION, AND CLEAN-UP AREAS SHALL BE WITHIN THE PROPERTY LIMITS AS SHOWN ON THE DRAWINGS AND MAINTAINED IN A MANNER AS REQUIRED BY THE CITY.
18. ALL EXISTING SITE TRAFFIC/REGULATORY SIGNAGE TO BE INVENTORIED AND IF REMOVED FOR CONSTRUCTION SHALL BE RETURNED TO LGU.
19. ALL EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTACT "GOPHER STATE ONE CALL" (651-454-0002 OR 800-252-1166) FOR UTILITY LOCATIONS, 48 HOURS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY UTILITIES THAT ARE DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.



FURNISH A AND INSTALL TEMPORARY FENCE AT THE TREE'S DRIP LINE OR CONSTRUCTION LIMITS AS SHOWN ON PLAN, PRIOR TO ANY CONSTRUCTION. WHERE POSSIBLE PLACE FENCE 25' BEYOND DRIP LINE. PLACE TREE PROTECTION SIGN ON POSTS, ONE PER INDIVIDUAL TREE (FACING CONSTRUCTION ACTIVITY), OR ONE EVERY 100' LF ALONG A GROVE OR MULTI-TREE PROTECTION AREA.

1 TREE PROTECTION
N T S

SITE AREA CALCULATIONS	EXISTING CONDITION		PROPOSED LOT 1		PROPOSED LOT 2		PROPOSED LOT 3		PUBLIC ROW	
BUILDING COVERAGE	5,820 SF	0.2%	53,310 SF	2.2%	3,250 SF	16.9%	2,236 SF	7.5%	0 SF	0.0%
ALL PAVEMENTS	11,143 SF	0.5%	77,743 SF	3.2%	908 SF	4.7%	1,279 SF	4.3%	10,246 SF	72.2%
ALL NON-PAVEMENTS	2,441,677 SF	99.3%	2,264,410 SF	94.5%	15,026 SF	78.3%	26,291 SF	88.2%	3,941 SF	27.8%
TOTAL SITE AREA	2,458,640 SF	100.0%	2,395,463 SF	100.0%	19,184 SF	100.0%	29,806 SF	100.0%	14,187 SF	100.0%

IMPERVIOUS SURFACE		
EXISTING CONDITION	16,963 SF	0.7%
PROPOSED CONDITION	148,972 SF	6.1%
DIFFERENCE (EX. VS PROP.)	132,009 SF	5.4%

SITE LAYOUT NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTACT "GOPHER STATE ONE CALL" (651-454-0002 OR 800-252-1166) FOR UTILITY LOCATIONS, 48 HOURS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY UTILITIES THAT ARE DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.
2. CONTRACTOR SHALL VERIFY LOCATIONS AND LAYOUT OF ALL SITE ELEMENTS PRIOR TO BEGINNING CONSTRUCTION, INCLUDING BUT NOT LIMITED TO, LOCATIONS OF EXISTING AND PROPOSED PROPERTY LINES, EASEMENTS, SETBACKS, UTILITIES, BUILDINGS AND PAVEMENTS. CONTRACTOR IS RESPONSIBLE FOR FINAL LOCATIONS OF ALL ELEMENTS FOR THE SITE. ANY REVISIONS REQUIRED AFTER COMMENCEMENT OF CONSTRUCTION, DUE TO LOCATIONAL ADJUSTMENTS SHALL BE CORRECTED AT NO ADDITIONAL COST TO OWNER. ADJUSTMENTS TO THE LAYOUT SHALL BE APPROVED BY THE ENGINEER/LANDSCAPE ARCHITECT PRIOR TO INSTALLATION OF MATERIALS. STAKE LAYOUT FOR APPROVAL.
3. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS PRIOR TO CONSTRUCTION, INCLUDING A RIGHT-OF-WAY AND STREET OPENING PERMIT.
4. THE CONTRACTOR SHALL VERIFY RECOMMENDATIONS NOTED IN THE GEO TECHNICAL REPORT PRIOR TO INSTALLATION OF SITE IMPROVEMENT MATERIALS.
5. CONTRACTOR SHALL FIELD VERIFY COORDINATES AND LOCATION DIMENSIONS & ELEVATIONS OF THE BUILDING AND STAKE FOR REVIEW AND APPROVAL BY THE OWNERS REPRESENTATIVE PRIOR TO INSTALLATION OF FOOTING MATERIALS.
6. LOCATIONS OF STRUCTURES, ROADWAY PAVEMENTS, CURBS AND GUTTERS, BOLLARDS, AND WALKS ARE APPROXIMATE AND SHALL BE STAKED IN THE FIELD, PRIOR TO INSTALLATION, FOR REVIEW AND APPROVAL BY THE ENGINEER/LANDSCAPE ARCHITECT.
7. CURB DIMENSIONS SHOWN ARE TO FACE OF CURB. BUILDING DIMENSIONS ARE TO FACE OF CONCRETE FOUNDATION. LOCATION OF BUILDING IS TO BUILDING FOUNDATION AND SHALL BE AS SHOWN ON THE DRAWINGS.
8. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OR SAMPLES AS SPECIFIED FOR REVIEW AND APPROVAL BY THE ENGINEER/LANDSCAPE ARCHITECT PRIOR TO FABRICATION FOR ALL PREFABRICATED SITE IMPROVEMENT MATERIALS SUCH AS, BUT NOT LIMITED TO THE FOLLOWING, FURNISHINGS, PAVEMENTS, WALLS, RAILINGS, BENCHES, FLAGPOLES, LANDING PADS FOR CURB RAMPS, AND LIGHT AND POLES. THE OWNER RESERVES THE RIGHT TO REJECT INSTALLED MATERIALS NOT PREVIOUSLY APPROVED.
9. PEDESTRIAN CURB RAMPS SHALL BE CONSTRUCTED WITH TRUNCATED DOME LANDING AREAS IN ACCORDANCE WITH A.D.A. REQUIREMENTS-SEE DETAIL.
10. CROSSWALK STRIPING SHALL BE 24" WIDE WHITE PAINTED LINE, SPACED 48" ON CENTER PERPENDICULAR TO THE FLOW OF TRAFFIC. WIDTH OF CROSSWALK SHALL BE 5' WIDE. ALL OTHER PAVEMENT MARKINGS SHALL BE WHITE IN COLOR UNLESS OTHERWISE NOTED OR REQUIRED BY ADA OR LOCAL GOVERNING BODIES.
11. SEE SITE PLAN FOR CURB AND GUTTER TYPE. TAPER BETWEEN CURB TYPES-SEE DETAIL.
12. ALL CURB RADII ARE MINIMUM 3' UNLESS OTHERWISE NOTED.
13. CONTRACTOR SHALL REFER TO FINAL PLAT FOR LOT BOUNDARIES, NUMBERS, AREAS AND DIMENSIONS PRIOR TO SITE IMPROVEMENTS.
14. FIELD VERIFY ALL EXISTING SITE CONDITIONS, DIMENSIONS.
15. PARKING IS TO BE SET PARALLEL OR PERPENDICULAR TO EXISTING BUILDING UNLESS NOTED OTHERWISE.
16. ALL PARKING LOT PAINT STRIPPING TO BE WHITE, 4" WIDE TYP.
17. BITUMINOUS PAVING TO BE "LIGHT DUTY" UNLESS OTHERWISE NOTED. SEE DETAIL SHEETS FOR PAVEMENT SECTIONS.
18. ALL TREES THAT ARE TO REMAIN ARE TO BE PROTECTED FROM DAMAGE WITH A CONSTRUCTION FENCE AT THE DRIP LINE. SEE LANDSCAPE DOCUMENTS.
19. CONTRACTOR IS RESPONSIBLE TO INSTALL ANY SIDEWALK AND CURBING PER DESIGN PLAN. CONTRACTOR TO VERIFY ALL CURBS AND SIDEWALKS WILL DRAIN PROPERLY IN FIELD CONDITIONS. **CONTRACTOR MUST CONTACT THE CIVIL ENGINEER 24-HOURS PRIOR TO ANY CURB AND/OR SIDEWALK INSTALLATION TO REVIEW AND INSPECT CURB STAKES. CONTRACTOR IS RESPONSIBLE FOR ANY CURB OR SIDEWALK REPLACEMENT IF THIS PROCEDURE IS NOT FOLLOWED.**

OPERATIONAL NOTES	
SNOW REMOVAL	ALL SNOW SHALL BE STORED ON-SITE OUTSIDE PARKING LOT. WHEN FULL, REMOVAL CO. SHALL REMOVE EXCESS OFF-SITE.
TRASH REMOVAL	TRASH SHALL BE PLACED IN EXTERIOR TRASH AREA AND REMOVED BY COMMERCIAL CO. WEEKLY.
DELIVERIES	DELIVERIES SHALL OCCUR AT THE FRONT DOOR VIA STANDARD COMMERCIAL DELIVERY VEHICLES (UPS, FED-EX, USPS).

GENERAL GRADING NOTES:

1. **CONTRACTOR SHALL VERIFY ALL BUILDING ELEVATIONS, (FFE, LFE, GFE), PRIOR TO CONSTRUCTION BY CROSS CHECKING WITH ARCHITECTURAL, STRUCTURAL AND CIVIL ELEVATIONS FOR EQUIVALENT "100" ELEVATIONS. THIS MUST BE DONE PRIOR TO EXCAVATION AND INSTALLATION OF ANY FOOTING MATERIALS. VERIFICATION OF THIS COORDINATION SHALL BE CONFIRMED IN WRITING BY CIVIL, SURVEYOR, ARCHITECTURAL, STRUCTURAL AND CONTRACTOR PRIOR TO CONSTRUCTION.**
2. ALL EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTACT "GOPHER STATE ONE CALL" (651-454-0002 OR 800-252-1166) FOR UTILITY LOCATIONS, 48 HOURS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY UTILITIES THAT ARE DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.
3. SEE SITE PLAN FOR HORIZONTAL LAYOUT & GENERAL GRADING NOTES.
4. THE CONTRACTOR SHALL COMPLETE THE SITE GRADING CONSTRUCTION (INCLUDING BUT NOT LIMITED TO SITE PREPARATION, SOIL CORRECTION, EXCAVATION, EMBANKMENT, ETC.) IN ACCORDANCE WITH THE REQUIREMENTS OF THE OWNER'S SOILS ENGINEER. ALL SOIL TESTING SHALL BE COMPLETED BY THE OWNER'S SOILS ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL REQUIRED SOIL TESTS AND INSPECTIONS WITH THE SOILS ENGINEER.
5. ANY ELEMENTS OF AN EARTH RETENTION SYSTEM AND RELATED EXCAVATIONS THAT FALL WITHIN THE PUBLIC RIGHT OF WAY WILL REQUIRE A "RIGHT OF WAY EXCAVATION PERMIT". CONTRACTOR IS RESPONSIBLE FOR AQUIRING THIS PERMIT PRIOR TO CONSTRUCTION IF APPLICABLE
6. ALL EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTACT "GOPHER STATE ONE CALL" (651-454-0002 OR 800-252-1166) FOR UTILITY LOCATIONS, 48 HOURS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY UTILITIES THAT ARE DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.
7. GRADING AND EXCAVATION ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT REQUIREMENTS & PERMIT REQUIREMENTS OF THE CITY.
8. PROPOSED SPOT GRADES ARE FLOW-LINE FINISHED GRADE ELEVATIONS, UNLESS OTHERWISE NOTED.
9. GRADES OF WALKS SHALL BE INSTALLED WITH 5% MAX. LONGITUDINAL SLOPE AND 1% MIN. AND 2% MAX. CROSS SLOPE, UNLESS OTHERWISE NOTED.
10. PROPOSED SLOPES SHALL NOT EXCEED 3:1 UNLESS INDICATED OTHERWISE ON THE DRAWINGS. MAXIMUM SLOPES IN MAINTAINED AREAS IS 4:1.
11. PROPOSED RETAINING WALLS, FREESTANDING WALLS, OR COMBINATION OF WALL TYPES GREATER THAN 4' IN HEIGHT SHALL BE DESIGNED AND ENGINEERED BY A REGISTERED RETAINING WALL ENGINEER. DESIGN DRAWINGS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF GRADE STAKES THROUGHOUT THE DURATION OF CONSTRUCTION TO ESTABLISH PROPER GRADES. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR A FINAL FIELD CHECK OF FINISHED GRADES ACCEPTABLE TO THE ENGINEER/LANDSCAPE ARCHITECT PRIOR TO TOPSOIL AND SODDING ACTIVITIES.
13. IF EXCESS OR SHORTAGE OF SOIL MATERIAL EXISTS, THE CONTRACTOR SHALL TRANSPORT ALL EXCESS SOIL MATERIAL OFF THE SITE TO AN AREA SELECTED BY THE CONTRACTOR, OR IMPORT SUITABLE MATERIAL TO THE SITE.
14. EXCAVATE TOPSOIL FROM AREAS TO BE FURTHER EXCAVATED OR REGRADED AND STOCKPILE IN AREAS DESIGNATED ON THE SITE. THE CONTRACTOR SHALL SALVAGE ENOUGH TOPSOIL FOR RESPREADING ON THE SITE AS SPECIFIED. EXCESS TOPSOIL SHALL BE PLACED IN EMBANKMENT AREAS, OUTSIDE OF BUILDING PADS, ROADWAYS AND PARKING AREAS. THE CONTRACTOR SHALL SUBCUT CUT AREAS, WHERE TURF IS TO BE ESTABLISHED, TO A DEPTH OF 6 INCHES. RESPREAD TOPSOIL IN AREAS WHERE TURF IS TO BE ESTABLISHED TO A MINIMUM DEPTH OF 6 INCHES.
15. FINISHED GRADING SHALL BE COMPLETED. THE CONTRACTOR SHALL UNIFORMLY GRADE AREAS WITHIN LIMITS OF GRADING, INCLUDING ADJACENT TRANSITION AREAS. PROVIDE A SMOOTH FINISHED SURFACE WITHIN SPECIFIED TOLERANCES, WITH UNIFORM LEVELS OR SLOPES BETWEEN POINTS WHERE ELEVATIONS ARE SHOWN, OR BETWEEN SUCH POINTS AND EXISTING GRADES. AREAS THAT HAVE BEEN FINISH GRADED SHALL BE PROTECTED FROM SUBSEQUENT CONSTRUCTION OPERATIONS, TRAFFIC AND EROSION. REPAIR ALL AREAS THAT HAVE BECOME RUTTED BY TRAFFIC OR ERODED BY WATER OR HAS SETTLED BELOW THE CORRECT GRADE. ALL AREAS DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO EQUAL OR BETTER THAN ORIGINAL CONDITION OR TO THE REQUIREMENTS OF THE NEW WORK.
16. PRIOR TO PLACEMENT OF THE AGGREGATE BASE, A TEST ROLL WILL BE REQUIRED ON THE STREET AND/OR PARKING AREA SUBGRADE. THE CONTRACTOR SHALL PROVIDE A LOADED TANDEM AXLE TRUCK WITH A GROSS WEIGHT OF 25 TONS. THE TEST ROLLING SHALL BE AT THE DIRECTION OF THE SOILS ENGINEER AND SHALL BE COMPLETED IN AREAS AS DIRECTED BY THE SOILS ENGINEER. THE SOILS ENGINEER SHALL DETERMINE WHICH SECTIONS OF THE STREET OR PARKING AREA ARE UNSTABLE. CORRECTION OF THE SUBGRADE SOILS SHALL BE COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF THE SOILS ENGINEER. NO TEST ROLL SHALL OCCUR WITHIN 10' OF ANY UNDERGROUND STORM RETENTION/DETENTION SYSTEMS.
17. TOLERANCES
    - 17.1. THE BUILDING SUBGRADE FINISHED SURFACE ELEVATION SHALL NOT VARY BY MORE THAN 0.30 FOOT ABOVE, OR 0.30 FOOT BELOW, THE PRESCRIBED ELEVATION AT ANY POINT WHERE MEASUREMENT IS MADE.
    - 17.2. THE STREET OR PARKING AREA SUBGRADE FINISHED SURFACE ELEVATION SHALL NOT VARY BY MORE THAN 0.05 FOOT ABOVE, OR 0.10 FOOT BELOW, THE PRESCRIBED ELEVATION OF ANY POINT WHERE MEASUREMENT IS MADE.
    - 17.3. AREAS WHICH ARE TO RECEIVE TOPSOIL SHALL BE GRADED TO WITHIN 0.30 FOOT ABOVE OR BELOW THE REQUIRED ELEVATION, UNLESS DIRECTED OTHERWISE BY THE ENGINEER.
    - 17.4. TOPSOIL SHALL BE GRADED TO PLUS OR MINUS 1/2 INCH OF THE SPECIFIED THICKNESS.
18. MAINTENANCE
    - 18.1. THE CONTRACTOR SHALL PROTECT NEWLY GRADED AREAS FROM TRAFFIC AND EROSION, AND KEEP AREA FREE OF TRASH AND DEBRIS.
    - 18.2. CONTRACTOR SHALL REPAIR AND REESTABLISH GRADES IN SETTLED, ERODED AND RUTTED AREAS TO SPECIFIED TOLERANCES. DURING THE CONSTRUCTION, IF REQUIRED, AND DURING THE WARRANTY PERIOD, ERODED AREAS WHERE TURF IS TO BE ESTABLISHED SHALL BE RESEEDED AND MULCHED.
    - 18.3. WHERE COMPLETED COMPACTED AREAS ARE DISTURBED BY SUBSEQUENT CONSTRUCTION OPERATIONS OR ADVERSE WEATHER, CONTRACTOR SHALL SCARIFY, SURFACE, RESHAPE, AND COMPACT TO REQUIRED DENSITY PRIOR TO FURTHER CONSTRUCTION.

NO OBSERVED GROUNDWATERWHILE PERFORMING THE BORINGS PER GEOTECHNICAL REPORT COMPLETED BY BRAUN INTERTEC, INC. ON 12/22/22.

CITY OF VICTORIA STANDARD PLAN NOTES:

1. SEE PLAN SHEET C0.2

GENERAL UTILITY NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTACT "GOPHER STATE ONE CALL" (651-454-0002 OR 800-252-1166) FOR UTILITY LOCATIONS, 48 HOURS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY UTILITIES THAT ARE DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.
2. SEE SITE PLAN FOR HORIZONTAL DIMENSIONS AND LAYOUT.
3. CONTRACTOR SHALL FIELD VERIFY LOCATION AND ELEVATION OF EXISTING UTILITIES AND TOPOGRAPHIC FEATURES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF DISCREPANCIES OR VARIATIONS FROM THE PLANS.
4. UTILITY INSTALLATION SHALL CONFORM TO THE CURRENT EDITION OF "STANDARD SPECIFICATIONS FOR WATER MAIN AND SERVICE LINE INSTALLATION" AND "SANITARY SEWER AND STORM SEWER INSTALLATION" AS PREPARED BY THE CITY ENGINEERS ASSOCIATION OF MINNESOTA (CEAM), AND SHALL CONFORM WITH THE REQUIREMENTS OF THE CITY AND THE PROJECT SPECIFICATIONS.
5. CASTINGS SHALL BE SALVAGED FROM STRUCTURE REMOVALS AND RE-USED OR PLACED AT THE DIRECTION OF THE OWNER.
6. ALL WATER PIPE SHALL BE CLASS 52 DUCTILE IRON PIPE (DIP) AWWA C151, ASME B16.4, AWWA C110, AWWA C153 UNLESS OTHERWISE NOTED.
7. ALL SANITARY SEWER SHALL BE SDR 26 POLYVINYL CHLORIDE (PVC) ASTM D3034 & F679, OR SCH 40 ASTM D1785, 2665, ASTM F794, 1866) UNLESS OTHERWISE NOTED.
8. ALL STORM SEWER PIPE SHALL BE HDPE ASTM F714 & F2306 WITH ASTM D3212 SPEC FITTINGS UNLESS OTHERWISE NOTED.
9. PIPE LENGTHS SHOWN ARE FROM CENTER TO CENTER OF STRUCTURE OR TO END OF FLARED END SECTION.
10. UTILITIES ON THE PLAN ARE SHOWN TO WITHIN 5' OF THE BUILDING FOOTPRINT. THE CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR THE FINAL CONNECTION TO BUILDING LINES. COORDINATE WITH ARCHITECTURAL AND MECHANICAL PLANS.
11. CATCH BASINS AND MANHOLES IN PAVED AREAS SHALL BE SUMPED 0.04 FEET. ALL CATCH BASINS IN GUTTERS SHALL BE SUMPED 0.15 FEET PER DETAILS. RIM ELEVATIONS SHOWN ON THIS PLAN DO NOT REFLECT SUMPED ELEVATIONS.
12. ALL FIRE HYDRANTS SHALL BE LOCATED 5 FEET BEHIND BACK OF CURB UNLESS OTHERWISE NOTED.
13. HYDRANT TYPE, VALVE, AND CONNECTION SHALL BE IN ACCORDANCE WITH CITY REQUIREMENTS. HYDRANT EXTENSIONS ARE INCIDENTAL.
14. A MINIMUM OF 8 FEET OF COVER IS REQUIRED OVER ALL WATERMAIN, UNLESS OTHERWISE NOTED. EXTRA DEPTH MAY BE REQUIRED TO MAINTAIN A MINIMUM OF 18" VERTICAL SEPARATION TO SANITARY OR STORM SEWER LINES. EXTRA DEPTH WATERMAIN IS INCIDENTAL.
15. A MINIMUM OF 18 INCHES OF VERTICAL SEPARATION AND 10 FEET OF HORIZONTAL SEPARATION IS REQUIRED FOR ALL UTILITIES, UNLESS OTHERWISE NOTED.
16. ALL CONNECTIONS TO EXISTING UTILITIES SHALL BE IN ACCORDANCE WITH CITY STANDARDS AND COORDINATED WITH THE CITY PRIOR TO CONSTRUCTION.
17. CONNECTIONS TO EXISTING STRUCTURES SHALL BE CORE-DRILLED.
18. COORDINATE LOCATIONS AND SIZES OF SERVICE CONNECTIONS WITH THE MECHANICAL DRAWINGS.
19. COORDINATE INSTALLATION AND SCHEDULING OF THE INSTALLATION OF UTILITIES WITH ADJACENT CONTRACTORS AND CITY STAFF.
20. ALL STREET REPAIRS AND PATCHING SHALL BE PERFORMED PER THE REQUIREMENTS OF THE CITY. ALL PAVEMENT CONNECTIONS SHALL BE SAWCUT. ALL TRAFFIC CONTROLS SHALL BE PROVIDED BY THE CONTRACTOR AND SHALL BE ESTABLISHED PER THE REQUIREMENTS OF THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MMUTCD) AND THE CITY. THIS SHALL INCLUDE BUT NOT BE LIMITED TO SIGNAGE, BARRICADES, FLASHERS, AND FLAGGERS AS NEEDED. ALL PUBLIC STREETS SHALL BE OPEN TO TRAFFIC AT ALL TIMES. NO ROAD CLOSURES SHALL BE PERMITTED WITHOUT APPROVAL BY THE CITY.
21. ALL STRUCTURES, PUBLIC AND PRIVATE, SHALL BE ADJUSTED TO PROPOSED GRADES WHERE REQUIRED. THE REQUIREMENTS OF ALL OWNERS MUST BE COMPLIED WITH. STRUCTURES BEING RESET TO PAVED AREAS MUST MEET OWNERS REQUIREMENTS FOR TRAFFIC LOADING.
22. CONTRACTOR SHALL COORDINATE ALL WORK WITH PRIVATE UTILITY COMPANIES.
23. CONTRACTOR SHALL COORDINATE CONNECTION OF IRRIGATION SERVICE TO UTILITIES. COORDINATE THE INSTALLATION OF IRRIGATION SLEEVES NECESSARY AS TO NOT IMPACT INSTALLATION OF UTILITIES.
24. CONTRACTOR SHALL MAINTAIN AS-BUILT PLANS THROUGHOUT CONSTRUCTION AND SUBMIT THESE PLANS TO ENGINEER UPON COMPLETION OF WORK.
25. ALL JOINTS AND CONNECTIONS IN STORM SEWER SYSTEM SHALL BE GASTIGHT OR WATERTIGHT. APPROVED RESILIENT RUBBER JOINTS MUST BE USED TO MAKE WATERTIGHT CONNECTIONS TO MANHOLES, CATCHBASINS, OR OTHER STRUCTURES.
26. ALL PORTIONS OF THE STORM SEWER SYSTEM LOCATED WITHIN 10 FEET OF THE BUILDING OR WATER SERVICE LINE MUST BE TESTED IN ACCORDANCE WITH MN RULES, CHAPTER 4714, SECTION 1109.0.
27. FOR ALL SITES LOCATED IN CLAY SOIL AREAS, DRAIN TILE MUST BE INSTALLED AT ALL LOW POINT CATCH BASINS 25' IN EACH DIRECTION. SEE PLAN AND DETAIL. INSTALL LOW POINT DRAIN TILE PER PLANS AND GEOTECHNICAL REPORT RECOMMENDATIONS AND REQUIREMENTS.

Know what's below. Call before you dig.

IRRIGATION NOTES:

1. ENTIRE SITE SHALL BE FULLY IRRIGATED. THE CONTRACTOR SHALL SUBMIT IRRIGATION SHOP DRAWINGS FOR REVIEW AND APPROVAL BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
2. SEE MECHANICAL AND ELECTRICAL PLANS AND SPECIFICATIONS FOR IRRIGATION WATER, METER, AND POWER CONNECTIONS.
3. CONTRACTOR TO VERIFY LOCATION OF ALL UNDERGROUND/ABOVE GROUND FACILITIES PRIOR TO ANY EXCAVATION/INSTALLATION. ANY DAMAGE TO UNDERGROUND/ABOVE GROUND FACILITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND COSTS ASSOCIATED WITH CORRECTING DAMAGES SHALL BE BORNE ENTIRELY BY THE CONTRACTOR.
4. SERVICE EQUIPMENT AND INSTALLATION SHALL BE PER LOCAL UTILITY COMPANY STANDARDS AND SHALL BE PER NATIONAL AND LOCAL CODES. EXACT LOCATION OF SERVICE EQUIPMENT SHALL BE COORDINATED WITH THE LANDSCAPE ARCHITECT OR EQUIVALENT AT THE JOB SITE.
5. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITY COMPANY FOR THE PROPOSED ELECTRICAL SERVICE AND METERING FACILITIES.
6. IRRIGATION WATER LINE CONNECTION SIZE IS 1-½" AT BUILDING. VERIFY WITH MECHANICAL PLANS.COVAGE.
7. ALL MAIN LINES SHALL BE 18" BELOW FINISHED GRADE.
8. ALL LATERAL LINES SHALL BE 12" BELLOW FINISHED GRADE.
9. ALL EXPOSED PVC RISERS, IF ANY, SHALL BE GRAY IN COLOR.
10. CONTRACTOR SHALL LAY ALL SLEEVES AND CONDUIT AT 2'-0" BELOW THE FINISHED GRADE OF THE TOP OF PAVEMENT. EXTEND SLEEVES TO 2'-0" BEYOND PAVEMENT.
11. CONTRACTOR SHALL MARK THE LOCATION OF ALL SLEEVES AND CONDUIT WITH THE SLEEVING MATERIAL "ELLED" TO 2'-0" ABOVE FINISHED GRADE AND CAPPED.
12. FABRICATE ALL PIPE TO MANUFACTURE'S SPECIFICATIONS WITH CLEAN AND SQUARE CUT JOINTS. USE QUALITY GRADE PRIMER AND SOLVENT CEMENT FORMULATED FOR INTENDED TYPE OF CONNECTION.
13. BACKFILL ALL TRENCHES WITH SOIL FREE OF SHARP OBJECTS AND DEBRIS.
14. ALL VALVE BOXES AND COVERS SHALL BE BLACK IN COLOR.
15. GROUP VALVE BOXES TOGETHER FOR EASE WHEN SERVICE IS REQUIRED. LOCATE IN PLANT BED AREAS WHENEVER POSSIBLE.
16. IRRIGATION CONTROLLER LOCATION SHALL BE VERIFIED ON-SITE WITH OWNER'S REPRESENTATIVE.
17. CONTROL WIRES: 14 GAUGE DIRECT BURIAL, SOLID COPPER IRRIGATION WIRE. RUN UNDER MAIN LINE. USE MOISTURE-PROOF SPLICES AND SPLICE ONLY AT VALVES OR PULL BOXES. RUN SEPARATE HOT AND COMMON WIRE TO EACH VALVE AND ONE (1) SPARE WIRE AND GROUND TO FURTHEST VALVE FROM CONTROLLER. LABEL OR COLOR CODE ALL WIRES.
18. AVOID OVER SPRAY ON BUILDINGS, PAVEMENT, WALLS AND ROADWAYS BY INDIVIDUALLY ADJUSTING RADIUS OR ARC ON SPRINKLER HEADS AND FLOW CONTROL ON AUTOMATIC VALVE.
19. ADJUST PRESSURE REGULATING VALVES FOR OPTIMUM PRESSURE ON SITE.
20. USE SCREENS ON ALL HEADS.
21. A SET OF AS-BUILT DRAWINGS SHALL BE MAINTAINED ON-SITE AT ALL TIMES IN AN UPDATED CONDITION.
22. ALL PIPE 3" AND OVER SHALL HAVE THRUST BLOCKING AT EACH TURN.
23. ALL AUTOMATIC REMOTE CONTROL VALVES WILL HAVE 3" MINIMUM DEPTH OF 3/4" WASHED GRAVEL UNDERNEATH VALVE AND VALVE BOX. GRAVEL SHALL EXTENT 3" BEYOND PERIMETER OF VALVE BOX.
24. THERE SHALL BE 3" MINIMUM SPACE BETWEEN BOTTOM OF VALVE BOX COVER AND TOP OF VALVE STRUCTURE.

LANDSCAPE NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTACT "GOPHER STATE ONE CALL" (651-454-0002 OR 800-252-1166) FOR UTILITY LOCATIONS, 48 HOURS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY UTILITIES THAT ARE DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.
2. WHERE SHOWN, SHRUB & PERENNIAL BEDS SHALL BE MULCHED WITH 4" DEPTH (MINIMUM AFTER INSTALLATION AND/OR TOP DRESSING OPERATIONS) OF SHREDDED CEDAR MULCH.
3. ALL TREES SHALL BE MULCHED WITH SHREDDED CEDAR MULCH TO OUTER EDGE OF SAUCER OR TO EDGE OF PLANTING BED, IF APPLICABLE. ALL MULCH SHALL BE KEPT WITHIN A MINIMUM OF 2" FROM TREE TRUNK.
4. IF SHOWN ON PLAN, RANDOM SIZED LIMESTONE BOULDERS COLOR AND SIZE TO COMPLIMENT NEW LANDSCAPING. OWNER TO APPROVE BOULDER SAMPLES PRIOR TO INSTALLATION.
5. PLANT MATERIALS SHALL CONFORM WITH THE AMERICAN ASSOCIATION OF NURSERYMEN STANDARDS AND SHALL BE OF HARDY STOCK, FREE FROM DISEASE, DAMAGE AND DISFIGURATION. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING PLUMPNESS OF PLANT MATERIAL FOR DURATION OF ACCEPTANCE PERIOD.
6. UPON DISCOVERY OF A DISCREPANCY BETWEEN THE QUANTITY OF PLANTS SHOWN ON THE SCHEDULE AND THE QUANTITY SHOWN ON THE PLAN, THE PLAN SHALL GOVERN.
7. CONDITION OF VEGETATION SHALL BE MONITORED BY THE LANDSCAPE ARCHITECT THROUGHOUT THE DURATION OF THE CONTRACT. LANDSCAPE MATERIALS PART OF THE CONTRACT SHALL BE WARRANTED FOR TWO (2) FULL GROWING SEASONS FROM SUBSTANTIAL COMPLETION DATE.
8. ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES SHALL RECEIVE 6" LAYER TOPSOIL AND SOD AS SPECIFIED UNLESS OTHERWISE NOTED ON THE DRAWINGS.
9. COORDINATE LOCATION OF VEGETATION WITH UNDERGROUND AND OVERHEAD UTILITIES, LIGHTING FIXTURES, DOORS AND WINDOWS. CONTRACTOR SHALL STAKE IN THE FIELD FINAL LOCATION OF TREES AND SHRUBS FOR REVIEW AND APPROVAL BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
10. ALL PLANT MATERIALS SHALL BE WATERED AND MAINTAINED UNTIL ACCEPTANCE.
11. REPAIR AT NO COST TO OWNER ALL DAMAGE RESULTING FROM LANDSCAPE CONTRACTOR'S ACTIVITIES.
12. SWEEP AND MAINTAIN ALL PAVED SURFACES FREE OF DEBRIS GENERATED FROM LANDSCAPE CONTRACTOR'S ACTIVITIES.
13. PROVIDE SITE WIDE IRRIGATION SYSTEM DESIGN AND INSTALLATION. SYSTEM SHALL BE FULLY PROGRAMMABLE AND CAPABLE OF ALTERNATE DATE WATERING. THE SYSTEM SHALL PROVIDE HEAD TO HEAD OR DRIP COVERAGE AND BE CAPABLE OF DELIVERING ONE INCH OF PRECIPITATION PER WEEK. SYSTEM SHALL EXTEND INTO THE PUBLIC RIGHT-OF-WAY TO THE EDGE OF PAVEMENT/BACK OF CURB.
14. CONTRACTOR SHALL SECURE APPROVAL OF PROPOSED IRRIGATION SYSTEM INLCUDING PRICING FROM OWNER, PRIOR TO INSTALLATION.

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY	
DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY	
DATE	DESCRIPTION

PROJECT NOTES

C0.1

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

1. ALL WATERMAIN AND ACCESSORIES MUST BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF VICTORIA STANDARD SPECIFICATIONS AND DETAILS.
2. MANIPULATION OF EXISTING VALVES SHALL BE PERFORMED ONLY BY CITY PERSONNEL.
3. WATERMAIN SHALL BE PVC C-900 DR18 WITH #12 AWG COPPER CLAD STEEL HIGH STRENGTH TRACER WIRE. COPPERHEAD PART #12308-HS, FURNISHED AND INSTALLED THROUGHOUT THE PIPE LENGTH. METALLIC TRACER SHALL BE ATTACHED TO ALL HYDRANTS WITH COPPERHEAD PART #T2R-FLPKG-5/8 OR APPROVED EQUAL.
4. ALL FITTINGS SHALL COMPLY WITH CEAM SPEC. 2611.2.A.1. ALL FITTINGS SHALL BE DUCTILE IRON PIPE WITH POLYETHYLENE ENCASEMENT. ALL CONNECTIONS SHALL BE INSTALLED UTILIZING COR-BLUE NUTS & BOLTS.
5. NO BENDING OF PVC WATER MAIN SHALL BE ALLOWED, FITTINGS MUST BE USED TO FACILITATE ANY CHANGES IN DEPTH OR HORIZONTAL ALIGNMENT.
6. USE GATE VALVES FOR ALL APPLICATIONS UP THROUGH 12 INCHES.
7. GATE VALVES SHALL BE RESILIENT WEDGE, AMERICAN FLOW CONTROL SERIES 2500 OR APPROVED EQUAL. GATE VALVES MUST COMPLY WITH CEAM SPEC 2611.2, C.2.
8. USE BUTTERFLY VALVES FOR ALL APPLICATIONS GREATER THAN 12 INCHES.
9. BUTTERFLY VALVES SHALL BE MUELLER LINESEAL III, OR APPROVED EQUAL. BUTTERFLY VALVES SHALL COMPLY WITH CEAM SPEC. 2611.2, C.3.
10. BOLTS AND NUTS ON ALL VALVES AND HYDRANTS SHALL BE STAINLESS STEEL.
11. USE GATE VALVE NUT ROD EXTENDER TO BRING OPERATING NUT TO WITHIN 12 INCHES OF SURFACE.
12. ALL HYDRANTS SHALL BE INSTALLED 5.0 FEET BACK OF CURB.
13. HYDRANTS SHALL BE WATEROUS "PACER," MODEL WB-67 OR APPROVED EQUAL, FITTED WITH E-Z GUIDE HYDRANT SAFETY MARKER & LOCATOR WITH PREMIUM FIBERGLASS ROD AND PAINTED RED.
14. HYDRANTS SHALL HAVE A 5-1/4-IN VALVE OPENING, TWO OUTLET NOZZLES FOR 2-1/2-IN D. HOSE CONNECTIONS AND ONE 4-1/2-IN D. PUMPER CONNECTION.
15. THE CURB STOP SERVICE ASSEMBLY SHALL HAVE A MINIMUM 1-FT ADJUSTMENT RANGE AND SHALL EXTEND 6 INCHES ABOVE FINISHED GRADE FULLY EXTENDED AND SHALL INCLUDE EXTENSION ROD.
16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING WATER TO HOMES AND BUSINESSES WHOSE WATER SUPPLY IS DISRUPTED DURING THE COURSE OF THE PROJECT.
17. PER ENGINEERING SPECIFICATIONS SECTION 3310 – WATER DISTRIBUTION, PRODUCTS, ARTICLE 19, EXTRA WATERMAIN ITEMS SHALL BE SUPPLIED AND DELIVERED TO PUBLIC WORKS, AS DIRECTED BY THE ENGINEER.

STANDARD PLAN NOTES
WATERMAIN PLANS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 200A Victoria

1. ALL SANITARY SEWER AND ACCESSORIES MUST BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF VICTORIA STANDARD SPECIFICATIONS AND DETAILS.
2. ALL SANITARY SEWER PVC PIPE SHALL BE INSTALLED ACCORDING TO CITY STANDARD DRAWING 103 "GRANULAR MATERIAL BEDDING METHOD" (FOR PVC SANITARY SEWER PIPE).
3. UNLESS NOTED OTHERWISE, ALL SMOOTH WALLED SANITARY SEWER PVC PIPE AND FITTINGS SHALL BE SDR 35 UP TO 20 FT IN DEPTH; SDR 26 FOR DEPTH BETWEEN 20 FT AND 25 FT; AND WILL BE PROJECT SPECIFIC FOR DEPTHS OVER 25 FT, WITH ELASTOMERIC GASKETED JOINTS.
4. ALL SANITARY SEWER SERVICES SHALL BE 4-INCH PVC, SCH. 40.
5. SMOOTH WALLED PVC PIPE AND FITTINGS SHALL CONFORM WITH THE REQUIREMENTS OF ASTM D-3034 FOR THE SIZE, STANDARD DIMENSION RATIO (SDR), AND STRENGTH REQUIREMENTS INDICATED ON THE PLANS, SPECIFICATIONS, AND SPECIAL PROVISIONS.
6. REINFORCED CONCRETE PIPE AND FITTINGS SHALL CONFORM WITH THE REQUIREMENTS OF MnDOT SPEC 3236 (REINFORCED CONCRETE PIPE) FOR THE TYPE, SIZE, AND STRENGTH CLASS SPECIFIED HEREIN.
7. JOINTS OF MANHOLE RISER SECTIONS SHALL BE TONGUE AND GROOVE WITH RUBBER "O" RING JOINTS PROVIDED ON ALL SANITARY SEWER MANHOLES, AND SHALL BE SEALED WITH MASTIC AND "INFI-SHIELD" 12" WIDE EXTERNAL SEAL WRAP OR APPROVED EQUAL.
8. SANITARY SEWER INLET AND OUTLET PIPES SHALL BE JOINED TO THE MANHOLE WITH A GASKETED, FLEXIBLE, WATERTIGHT CONNECTION TO ALLOW DIFFERENTIAL SETTLEMENT OF THE PIPE AND MANHOLE TO TAKE PLACE.
9. A 1'-0" TO 1'-6" MANHOLE SECTION SHALL BE INSTALLED UNDER THE CONE SECTION TO ALLOW FOR HEIGHT ADJUSTMENT WHENEVER POSSIBLE.
10. ALL SERVICE LINE STUBS MUST HAVE A 2"x2" HARDWOOD MARKER WITH METAL SPIKE RUNNING FROM THE END OF PIPE TO FINISHED GRADE ELEVATION.
11. UPON MAKING A CONNECTION TO AN EXISTING SANITARY SEWER STUB OR MANHOLE, DIRT AND DEBRIS SHALL BE PREVENTED FROM ENTERING THE EXISTING SEWER BY IMMEDIATELY INSTALLING WATERTIGHT PLUGS AS NEEDED IN THE EXISTING MANHOLE.
12. ALL NEW SANITARY SEWER PIPE SHALL BE FLUSHED AND TELEVISED PRIOR TO SUBSTANTIAL COMPLETION – SEE SPECIFICATION SECTION 1700 – CLOSEOUT REQUIREMENTS.
13. ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

STANDARD PLAN NOTES
SANITARY SEWER PLANS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 300A Victoria

1. ALL STORM SEWER AND ACCESSORIES MUST BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF VICTORIA STANDARD SPECIFICATIONS AND DETAILS.
2. REINFORCED CONCRETE PIPE AND FITTINGS SHALL CONFORM WITH THE REQUIREMENTS OF MnDOT SPEC 3236 (REINFORCED CONCRETE PIPE) FOR THE TYPE, SIZE, AND STRENGTH CLASS SPECIFIED HEREIN.
3. PRECAST CONCRETE MANHOLE AND CATCH BASIN SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-477.
4. A 1'-0" TO 1'-6" MANHOLE SECTION SHALL BE INSTALLED UNDER THE CONE SECTION TO ALLOW FOR HEIGHT ADJUSTMENT WHENEVER POSSIBLE.
5. JOINTS OF MANHOLE RISER SECTIONS SHALL BE TONGUE AND GROOVE WITH RUBBER "O" RING JOINTS PROVIDED ON ALL STORM SEWER MANHOLES, AND SHALL BE WRAPPED WITH "INFI-SHIELD" 12" WIDE EXTERNAL SEAL WRAP OR APPROVED EQUAL.
6. RIP-RAP SHALL BE HAND-PLACED OVER GEOTEXTILE FABRIC AND CONFORM TO MnDOT SPEC. 3601, CLASS III, OR AS SPECIFIED HEREIN.
7. THE GEOTEXTILE FABRIC USED UNDER RIP-RAP SHALL EXTEND 3 FT UNDER THE APRON.
8. FURNISH & INSTALL TRASH GUARDS ON ALL FLARED END SECTIONS.
9. ALL SILT SHALL BE CLEANED OUT FROM THE STORM SEWER SYSTEM, INCLUDING THE RIP-RAP AT THE END OF THE PROJECT.
10. CB/MH WITH SUMP, TYPE 405, REQUIRED AS FIRST STRUCTURE UPSTREAM FROM ANY STORMWATER BMP.
11. ALL NEW STORM SEWER PIPE SHALL BE FLUSHED AND TELEVISED PRIOR TO SUBSTANTIAL COMPLETION – SEE SPECIFICATION SECTION 1700 – CLOSEOUT REQUIREMENTS.
13. ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

STANDARD PLAN NOTES
STORM SEWER PLANS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 400A Victoria

1. BITUMINOUS TRAILS AND SIDEWALKS MUST BE CONSTRUCTED TO MAINTAIN POSITIVE DRAINAGE AWAY FROM THE PATHWAYS THROUGHOUT THE ENTIRE LENGTH.
2. TOPSOIL AND BACKFILLING OPERATIONS MUST BE COMPLETED TO AVOID DAMAGE TO THE BITUMINOUS TRAILS AND SIDEWALKS. FINAL GRADE OF BACKFILL AND TOPSOIL MUST BE FLUSH WITH THE PATH EDGE TO AVOID TRAPPING WATER.
3. DIVIDE SIDEWALK INTO SECTIONS WITH CONTRACTION JOINTS. SPACING SHALL NOT BE LESS THAN 3 FT NOR GREATER THAN 12 FT IN ANY DIMENSION.
4. CONCRETE PEDESTRIAN RAMPS MUST BE CONSTRUCTED AT ALL INTERSECTIONS UNDER THE SUPERVISION OF A CERTIFIED ADA SUPERVISOR.

STANDARD PLAN NOTES
SIDEWALKS AND TRAILS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 500A Victoria

1. THE CONTRACTOR SHALL CONDUCT OPERATIONS AND IMPLEMENT MINNESOTA POLLUTION CONTROL AGENCY (MPCA) BEST MANAGEMENT PRACTICES (BMP) TO CONTROL SITE SILTATION AND EROSION INTO DRAINAGE WAYS. THE CONTRACTOR SHALL COMPLY WITH ALL CONDITIONS AND COMPLETION DATES RELATIVE TO ALL PERMITS ISSUED FOR THE WORK TO BE COMPLETED. THE ENGINEER MAY ISSUE A STOP WORK ORDER FOR ALL DEVELOPMENT WORK AND BUILDING CONSTRUCTION FOR NONCOMPLIANCE WITH THESE MEASURES.
2. SEQUENCING. ALL SILT FENCE AND OTHER EROSION CONTROL MEASURES SHALL BE IN PLACE AND APPROVED BY ENGINEER PRIOR TO ANY REMOVALS, EXCAVATION OR CONSTRUCTION AND SHALL BE MAINTAINED UNTIL VIABLE TURF OR GROUND COVER HAS BEEN ESTABLISHED AND APPROVED BY THE ENGINEER.
3. SILT FENCE. THE CONTRACTOR SHALL INSTALL SILT FENCE AT THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE CITY STANDARD DETAILS. SILT FENCE DAMS AND INTERIM SUMPS SHALL BE PLACED TO INTERCEPT SILT FROM CONCENTRATED RUNOFF FROM OPEN GRADED AREAS. ADDITIONAL SILT FENCE SHALL BE REQUIRED AS DIRECTED BY THE ENGINEER.
4. STOCKPILES. ALL STOCKPILE AREAS SHALL HAVE SILT FENCE OR SEDIMENT TRAPPING SYSTEMS PLACED AROUND THE ENTIRE PERIMETER.
5. INLET PROTECTION. THE CONTRACTOR SHALL INSTALL INLET PROTECTION ON ALL EXISTING STORM SEWER INLETS IN ACCORDANCE WITH THE CITY STANDARD DETAILS. INLET PROTECTION SHALL ALSO BE PROVIDED ON ALL PROPOSED STORM SEWER INLETS IMMEDIATELY FOLLOWING CONSTRUCTION OF THE INLET. INLET PROTECTION MUST BE INSTALLED IN A MANNER THAT WILL NOT IMPOUND WATER FOR EXTENDED PERIODS OF TIME OR IN A MANNER THAT PRESENTS A HAZARD TO VEHICULAR OR PEDESTRIAN TRAFFIC.
6. TEMPORARY SEDIMENT BASINS. THE CONTRACTOR SHALL INCORPORATE TEMPORARY SEDIMENT BASINS THROUGHOUT THE CONSTRUCTION SITE TO CAPTURE RUNOFF AND SLOW THE FLOW OF WATER AND ALLOW SEDIMENT TO SETTLE OUT. TEMPORARY SEDIMENT BASINS SHALL BE INSTALLED AS DIRECTED BY THE CITY ENGINEER.
7. ROCK CONSTRUCTION ENTRANCE. A ROCK ENTRANCE SHALL BE CONSTRUCTED AND MAINTAINED AS SHOWN ON THE PLAN TO REDUCE TRACKING OF SILT AND DIRT ONTO THE PUBLIC STREETS. A GEOTEXTILE FABRIC SHALL BE PLACED UNDERNEATH THE ROCK. THE ROCK SHALL BE PERIODICALLY REPLENISHED TO MAINTAIN THE INTENDED PERFORMANCE. MUD AND DEBRIS SHALL BE REMOVED OR SCRAPED FROM TIRES AND VEHICLE UNDERCARRIAGE PRIOR TO LEAVING THE SITE.
8. STREET SWEEPING. ALL STREETS USED FOR ACCESS TO THE SITE AND HAUL ROUTES USED FOR CONSTRUCTION EQUIPMENT AND MATERIAL SUPPLIES SHALL BE CLEANED AT THE END OF EACH WORKING DAY. THE CITY OR ENGINEER MAY ORDER ADDITIONAL SWEEPING OF THE STREETS AS DEEMED REQUIRED AT DEVELOPER/CONTRACTOR EXPENSE.

STANDARD PLAN NOTES
GRADING AND EROSION CONTROL PLANS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 600A Victoria

9. DEWATERING. EACH EXCAVATION SHALL BE KEPT DRY DURING THE COURSE OF ALL WORK HEREIN, INCLUDING SUBGRADE CORRECTION, PIPE INSTALLATION, STRUCTURE CONSTRUCTION AND BACKFILLING, TO THE EXTENT THAT NO DAMAGE FROM HYDROSTATIC PRESSURE, FLOTATION OR OTHER DAMAGE RESULTS. ALL EXCAVATIONS SHALL BE DEWATERED TO A DEPTH OF AT LEAST 3 INCHES BELOW THE BOTTOM OF THE CONCRETE SLAB OR PIPE TO BE INSTALLED THEREIN. THE CONTRACTOR MAY USE ANY METHOD OR COMBINATION OF METHODS FOR DEWATERING HE CHOOSES; HOWEVER, ALL DEWATERING METHODS AND EQUIPMENT WHICH, IN THE OPINION OF THE ENGINEER, ARE INEFFECTIVE SHALL BE ABANDONED, IMPROVED, REPLACED OR OTHERWISE ALTERED TO OBTAIN EFFECTIVE DEWATERING. THE CONTRACTOR SHALL PROVIDE ALL POWER, PUMPS, MATERIALS AND APPARATUS NECESSARY, AND SHALL BE RESPONSIBLE FOR DISPOSING OF THE WATER PUMPED FROM THE EXCAVATION IN A MANNER WHICH WILL NOT INTERFERE WITH OTHER WORK WITHIN THE AREA AND NOT TO DAMAGE PUBLIC OR PRIVATE PROPERTY. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR THE CONDITION OF ANY PIPE, CONDUIT, DITCH, CHANNEL OR NATURAL WATERCOURSE UTILIZED FOR DRAINAGE PURPOSES, AND ALL EROSION, SEDIMENT OR OTHER ADVERSE RESULTS OF THEIR USE SHALL BE REPAIRED.
10. POSITIVE DRAINAGE AND PROTECTION. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE SITE AT ALL TIMES. LOW POINTS WITHIN AND ALONG ROADWAYS ARE EXPRESSLY PROHIBITED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY DITCHES, PIPING OR OTHER MEANS TO FACILITATE PROPER DRAINAGE DURING CONSTRUCTION. TO PROTECT PREVIOUSLY GRADED AREAS FROM EROSION, WOOD FIBER BLANKET SHALL BE PLACED IMMEDIATELY ON STEEP SLOPES (1:3 OR GREATER) AND EMBANKMENTS, PERMANENT AND TEMPORARY PONDS, AND OUTLETS AND OVERFLOWS TO PROTECT THE COMPLETED GRADE AND MINIMIZE SILT IN THE RUNOFF.
11. DRAINAGE DITCHES. THE NORMAL WETTED PERIMETER OF ANY TEMPORARY OR PERMANENT DRAINAGE DITCH OR SWALE THAT DRAINS WATER FROM ANY PORTION OF THE CONSTRUCTION SITE, OR DIVERTS WATER AROUND THE SITE, MUST BE STABILIZED WITHIN 200 LINEAL FEET FROM THE PROPERTY EDGE, OR FROM THE POINT OF DISCHARGE INTO ANY SURFACE WATER. STABILIZATION OF THE LAST 200 LINEAL FEET MUST BE COMPLETED WITHIN 24 HOURS AFTER CONNECTING TO A SURFACE WATER. STABILIZATION OF THE REMAINING PORTIONS OF ANY TEMPORARY OR PERMANENT DITCHES OR SWALES MUST BE COMPLETE WITHIN 14 DAYS AFTER CONNECTING TO A SURFACE WATER AND CONSTRUCTION IN THAT PORTION OF THE DITCH HAS TEMPORARILY OR PERMANENTLY CEASED. TEMPORARY OR PERMANENT DITCHES OR SWALES THAT ARE BEING USED AS A SEDIMENT CONTAINMENT SYSTEM (WITH PROPERLY DESIGNED ROCK DITCH CHECKS, BIO ROLLS, SILT DIKES, ETC.) DO NOT NEED TO BE STABILIZED. THESE AREAS MUST BE STABILIZED WITHIN 24 HOURS AFTER NO LONGER BEING USED AS A SEDIMENT CONTAINMENT SYSTEM.
12. TURF ESTABLISHMENT. ALL EXPOSED SOIL AREAS MUST BE STABILIZED AS SOON AS POSSIBLE TO LIMIT SOIL EROSION BUT IN NO CASE LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.

STANDARD PLAN NOTES
GRADING AND EROSION CONTROL PLANS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 600B Victoria

13. MAINTENANCE AND INSPECTION. EROSION CONTROL MEASURES SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION AND UNTIL SATISFACTORY ESTABLISHMENT OF PERMANENT GROUND COVER IS OBTAINED. ALL EROSION AND SEDIMENTATION CONTROL MEASURES, AND STORMWATER OUTFALLS MUST BE BE INSPECTED WEEKLY, AND WITHIN 24 HOURS OF THE SITE RECEIVING 0.5 INCHES OF RAIN. REPAIRS MUST BE MADE ON THE SAME DAY OR FOLLOWING DAY OF THE INSPECTION. UNSATISFACTORY CONDITIONS NOT REPAIRED OR CLEANED UP WITHIN 48-HOURS OF NOTIFICATION SHALL RESULT IN A STOP WORK ORDER, AND/OR SAID WORK SHALL BE COMPLETED AT CONTRACTOR'S EXPENSE.
14. REMOVAL. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL TEMPORARY EROSION CONTROL MEASURES, STRUCTURES AND DEVICES ONLY AFTER RECEIVING ENGINEER APPROVAL. ALL DEBRIS, STAKES, AND SILTS ALONG SILT FENCES SHALL BE REMOVED AND DISPOSED OFF SITE. THE CONTRACTOR SHALL HAND RAKE SILTED AREAS ALONG THE FENCE LOCATIONS TO PROVIDE A SMOOTH FINAL GRADE AND SHALL RESTORE THE GROUND SURFACE WITH SEED OR SOD, AS REQUIRED, TO MATCH THE FINISHED GRADE TO THE ADJACENT AREA.
15. FINAL STORM SEWER SYSTEM. AT THE COMPLETION OF THE WORK AND BEFORE THE FINAL WALK THROUGH, THE CONTRACTOR SHALL REMOVE STORM SEWER INLET PROTECTION MEASURES AND THOROUGHLY FLUSH THE STORM SEWER SYSTEM. SEDIMENT AND DEBRIS SHALL BE COMPLETELY REMOVED AND CLEANED AT THE INLETS, OUTLETS, AND DOWNSTREAM OF EACH OUTLET. RIPRAP AND GEOTEXTILE FABRIC MAY REQUIRE REPLACEMENT AS DIRECTED BY THE ENGINEER TO OBTAIN A LIKE NEW INSTALLATION ACCEPTABLE TO THE CITY.
16. DITCH CHECK (BIOROLL BLANKET SYSTEM). BIOROLL AND BLANKET SYSTEMS SHALL BE BE INSTALLED AS DITCH CHECKS ONLY IN SPECIFIED LOCATIONS AS APPROVED BY THE CITY ENGINEER. BIOROLLS ARE NOT TO BE UTILIZED IN AREAS WHERE VEHICLE AND CONSTRUCTION TRAFFIC OCCUR.
17. FLOTATION SILT CURTAIN. FLOTATION SILT CURTAIN SHALL BE UTILIZED WHEN CONSTRUCTION ACTIVITIES OCCUR DIRECTLY ADJACENT TO LAKES, STREAMS OR WETLANDS IN ORDER TO CONTAIN SEDIMENTS NEAR THE BANKS OF WORKING AREAS. THE INSTALLATION OF FLOTATION SILT CURTAINS WILL BE REQUIRED AS DIRECTED BY THE CITY ENGINEER.
18. CONCRETE WASHOUT ONSITE. ALL LIQUID AND SOLID WASTES GENERATED BY CONCRETE WASHOUT OPERATIONS MUST BE CONTAINED IN A LEAK-PROOF CONTAINMENT FACILITY OR IMPERMEABLE LINER. A COMPACTED CLAY LINER THAT DOES NOT ALLOW WASHOUT LIQUIDS TO ENTER GROUND WATER IS CONSIDERED AN IMPERMEABLE LINER. THE LIQUID AND SOLID WASTES MUST NOT CONTACT THE GROUND, AND THERE MUST NOT BE RUNOFF FROM THE CONCRETE WASHOUT OPERATIONS OR AREAS. LIQUID AND SOLID WASTES MUST BE DISPOSED OF PROPERLY AND IN COMPLIANCE WITH MPCA REGULATIONS. A SIGN MUST BE INSTALLED ADJACENT TO EACH WASHOUT FACILITY TO INFORM CONCRETE EQUIPMENT OPERATORS TO UTILIZE THE PROPER FACILITIES.

STANDARD PLAN NOTES
GRADING AND EROSION CONTROL PLANS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 600C Victoria

1. RESTORE ALL DISTURBED AREAS WITH 6 INCHES OF TOPSOIL CONFORMING TO MNDOT 3877.
2. PROTECT ALL STORM SEWER INLETS AS SPECIFIED HEREIN AND MAINTAIN UNTIL STREET CONSTRUCTION IS COMPLETED.
3. MAINTAIN ALL SILT FENCE AND REPAIR OR REPLACE AS NEEDED OR REQUIRED UNTIL TURF HAS BEEN ESTABLISHED.
4. RESTORATION WORK SHALL BEGIN WITHIN 7 DAYS OF FINAL GRADING.
5. PLACE 1 ROW OF MNDOT 3885 CATEGORY 3, TYPE 2S (NATURAL NETTING ON BOTH SIDES) EROSION CONTROL BLANKET (8" MIN) BEHIND BACK OF CURB WITH SEED IN ACCORDANCE WITH THE CITY STANDARD SPECIFICATIONS. PLACE HEAVY DUTY SILT FENCE (SPEC. 2573.3, TYPE MS/HI) DIRECTLY BEHIND BLANKET. IN AREAS WITH SIDEWALK/TRAIL, INSTALL SILT FENCE ON BACKSIDE OF WALKWAY.
6. BOULEVARD AND DITCH RESTORATION INCLUDES FINE GRADING, WHICH INCLUDES THE REMOVAL OF ROCKS, DEBRIS AND SOIL CHUNKS, WHILE MAINTAINING POSITIVE DRAINAGE.
7. UPON COMPLETION OF MASS GRADING, ALL DRAINAGE EASEMENTS SHALL BE PROTECTED BY SILT FENCE (OR SIMILAR BARRIER) UNTIL ADJACENT AREAS ARE PERMANENTLY AND FULLY ESTABLISHED.
8. CITY OWNED AND MAINTAINED PROPERTY/OUTLOTS PERMANENT RESTORATION:
   A. BOULEVARDS ADJACENT TO CITY OWNED PROPERTY SHALL BE PERMANENTLY ESTABLISHED WITH 6" TOPSOIL AND SOD. THIS INCLUDES THE ENTIRE AREA BETWEEN BACK OF CURB AND RIGHT OF WAY LINE.
   B. ALL OTHER AREAS WHERE SOD IS NOT REQUIRED SHALL BE ESTABLISHED WITH 6" TOPSOIL, GRADED TO A SMOOTH MOWABLE CONDITION AND SEEDED WITH MnDOT 3876, CAT 25, MIX 151, HIGH MAINTENANCE TURF MIX, WITH PLS (PURE LIVE SEED) RATE OF 200 LB/ACRE
   C. EROSION CONTROL BLANKET SHALL BE MnDOT 3885-1, CAT 3N (NATURAL NETTING AND STITCHING)

STANDARD PLAN NOTES
SITE RESTORATION PLANS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 600D Victoria

1. STREET LIGHTING SHALL BE INSTALLED PER CITY STANDARDS 5 FEET BACK OF CURB IN LOCATIONS SHOWN ON PLAN.
2. ALL SIGNS MUST MEET MMUTCD.
3. ALL SIGN SHEATHING TO BE HIGH INTENSITY DIAMOND GRADE DG3.
4. SIGN POSTS TO BE UNPAINTED GALVANIZED METAL, 3.0 LBS/FT.
5. CITY TO FURNISH AND INSTALL STREET SIGNS.
6. POLY PREFORMED PAVEMENT MATERIAL SHALL BE USED FOR ALL PAVEMENT SYMBOLS.
7. EPOXY RESIN AND DROP-ON GLASS BEADS FOR PAVEMENT MARKINGS SHALL MEET THE REQUIREMENTS OF MnDOT "SPECIFICATIONS FOR CONSTRUCTION, 2018 EDITION".
8. ACRYLIC LATEX WATERBORNE TRAFFIC MARKING PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO MnDOT 3591 WATER-BASED TRAFFIC PAINT OR APPROVED EQUAL.

STANDARD PLAN NOTES
SIGNING/PAVEMENT MARKINGS/LIGHTING PLANS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 700A Victoria

1. PRIOR TO TREE STAKING AND PLANTING OPERATIONS CONTRACTOR MUST CONTACT GOPHER STATE ONE CALL (www.gopherstateonecall.org or 811) TO VERIFY UNDERGROUND UTILITIES. WHERE PRIVATE UTILITIES EXIST ON-SITE THE CONTRACTOR IS REQUIRED TO HAVE THOSE LOCATED AS WELL.
2. PLANT MATERIALS SHALL MEET AMERICAN STANDARD FOR NURSERY STOCK: ANSI Z60.1 LATEST EDITION. http://americanhort.org/documents/ANSI Nursery Stock Standards AmericanHort 2014.pdf
3. NO PLANT SUBSTITUTIONS SHALL BE MADE WITHOUT THE PRIOR WRITTEN AUTHORIZATION FROM THE CITY.
4. ALL TREE PROTECTION MEASURES TO BE FIELD STAKED PRIOR TO INSTALLATION. CONTRACTOR TO COORDINATE FIELD REVIEW OF PROPOSED TREE PROTECTION LOCATIONS WITH THE CITY AND PROJECT LANDSCAPE ARCHITECT PRIOR TO ANY TREE PROTECTION INSTALLATION.
5. ALL TREE LOCATIONS TO BE FIELD STAKED PRIOR TO INSTALLATION. CONTRACTOR TO COORDINATE FIELD REVIEW OF PROPOSED TREE LOCATIONS WITH THE CITY AND PROJECT LANDSCAPE ARCHITECT PRIOR TO ANY TREE INSTALLATION.
6. ALL PLANTS SHALL BE PLANTED IMMEDIATELY UPON ARRIVAL TO PROJECT SITE. NO PLANT MATERIAL IS TO BE LEFT OVERNIGHT ON THE PROJECT SITE WITHOUT BEING INSTALLED UNLESS WRITTEN APPROVAL BY CITY.
7. ALL TREES, SHRUBS, PERENNIALS AND TURF LAWN TO HAVE A ONE YEAR WARRANTY BEGINNING UPON WRITTEN ACCEPTANCE BY THE CITY. DEFECTIVE PLANTS AS DETERMINED BY THE CITY SHALL BE REPLACED WITHIN 30 DAYS OF NOTICE DURING THE GROWING SEASON, AND REPLACEMENT MATERIALS SHALL RECEIVE THE SAME ONE YEAR WARRANTY UNTIL PLANTS ARE SUCCESSFULLY ESTABLISHED.
8. CONTRACTOR TO PROTECT AND MAINTAIN ALL PLANTINGS AND PLANT BEDS, INCLUDING PROTECTION FROM WILDLIFE, WEEDING, RE-MULCHING, FERTILIZATION, IRRIGATION AND ALL OTHER TYPICAL FORMS OF HORTICULTURAL CARE UNTIL THE END OF THE WARRANTY PERIOD AS DETERMINED AND APPROVED BY CITY.
9. ALL AREAS DISTURBED ADJACENT TO THE PROJECT SITE INCLUDING BOULEVARDS SHALL BE REPAIRED AND MAINTAINED PER CITY DIRECTION.
10. PROVIDE A THREE YEAR MAINTENANCE PLAN FOR ALL SEEDING OF PLANT MATERIALS/AREAS WITHIN ALL COMMERCIAL PROPERTIES, COMMONLY HELD HOA AREAS, CITY OUTLOTS AND R.O.W. AREAS.
11. ALL TREE PLANTING HOLES WITHIN THE RIGHT-OF-WAY, AND AS DIRECTED BY CITY STAFF, SHALL BE LINED WITH A LINEAR ROOT BARRIER 4-FEET DEEP WHEN ADJACENT TO BACK OF CURB AND/OR WALKWAY. TREES AND ROOT BARRIERS SHALL BE INSTALLED IN LOCATIONS TO AVOID SUMP PUMP SERVICE STUBS.

STANDARD PLAN NOTES
LANDSCAPE PLANS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 900A Victoria

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

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386
UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

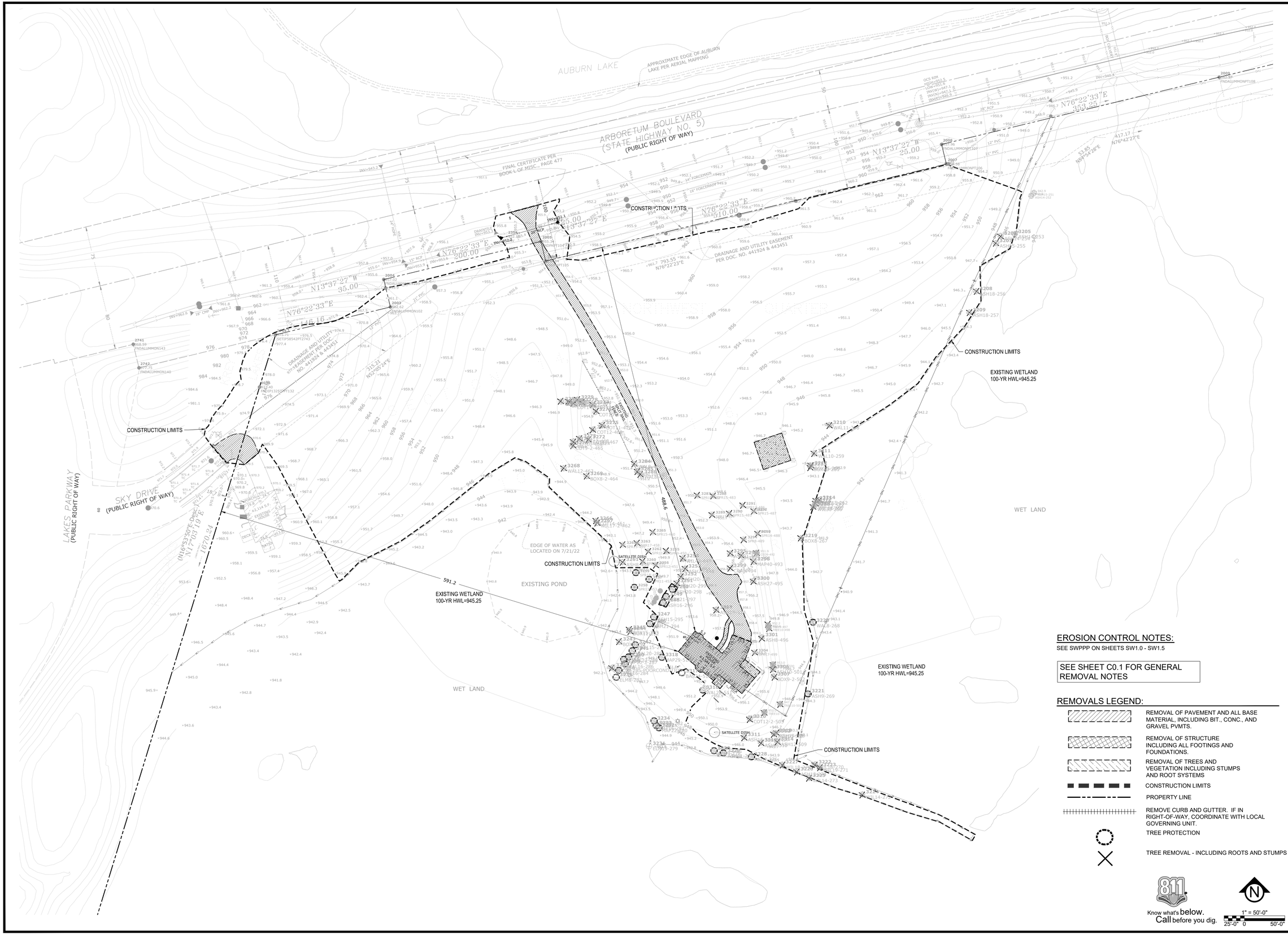
REVISION SUMMARY

DATE	DESCRIPTION

STANDARD CITY OF VICTORIA PLAN NOTES

C0.2

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



EROSION CONTROL NOTES:

SEE SWPPP ON SHEETS SW1.0 - SW1.5

SEE SHEET C0.1 FOR GENERAL REMOVAL NOTES

REMOVALS LEGEND:

- REMOVAL OF PAVEMENT AND ALL BASE MATERIAL, INCLUDING BIT., CONC., AND GRAVEL PVMTS.
- REMOVAL OF STRUCTURE INCLUDING ALL FOOTINGS AND FOUNDATIONS.
- REMOVAL OF TREES AND VEGETATION INCLUDING STUMPS AND ROOT SYSTEMS
- CONSTRUCTION LIMITS
- PROPERTY LINE
- REMOVE CURB AND GUTTER. IF IN RIGHT-OF-WAY, COORDINATE WITH LOCAL GOVERNING UNIT.
- TREE PROTECTION
- TREE REMOVAL - INCLUDING ROOTS AND STUMPS

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

1" = 50'-0"
25'-0" 0 50'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY:	BB, BN
REVIEWED BY:	DK
PROJECT MANAGER:	DK
PROJECT NUMBER:	22500

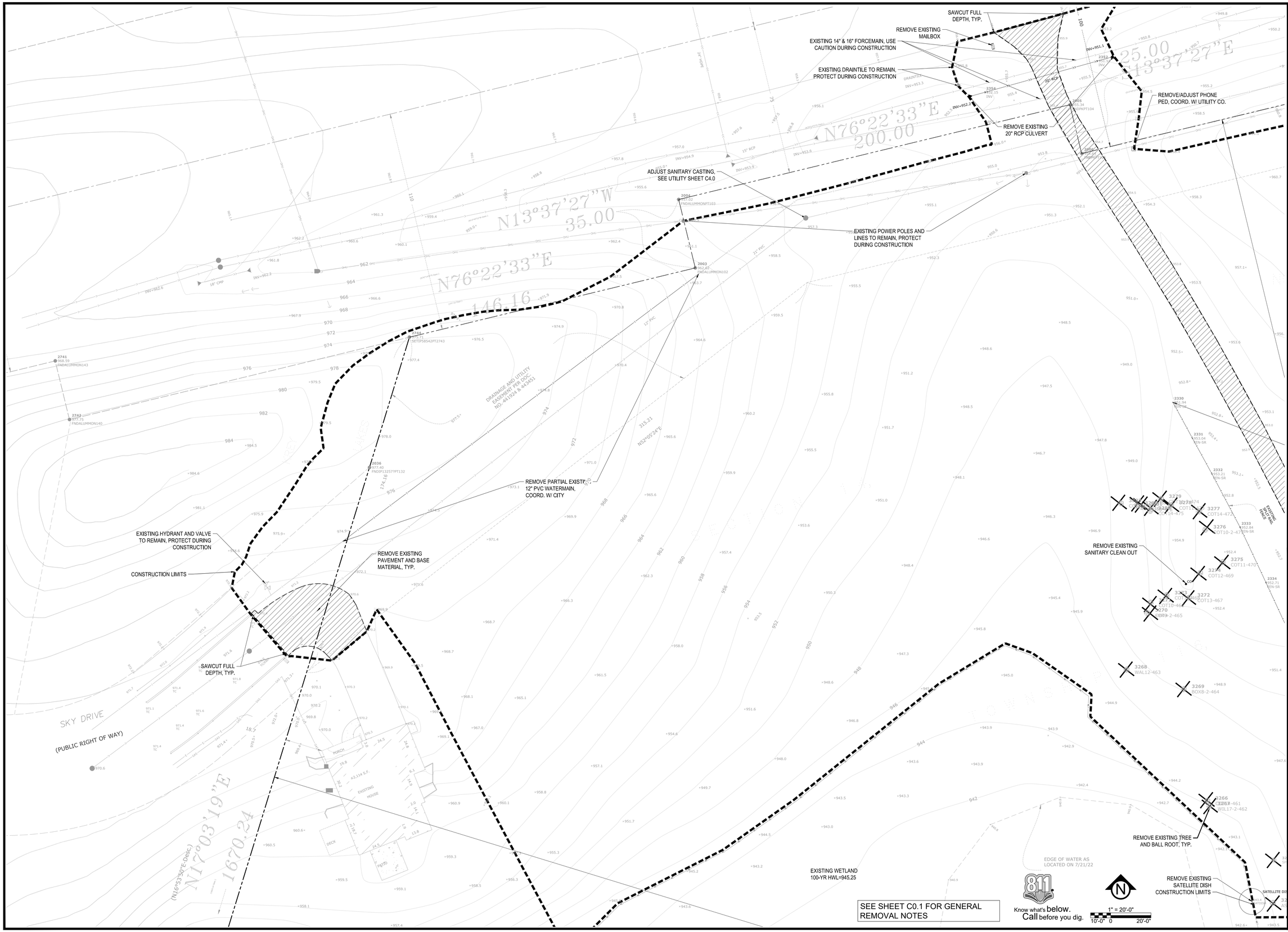
REVISION SUMMARY

DATE	DESCRIPTION

REMOVALS PLAN OVERALL

C1.0

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

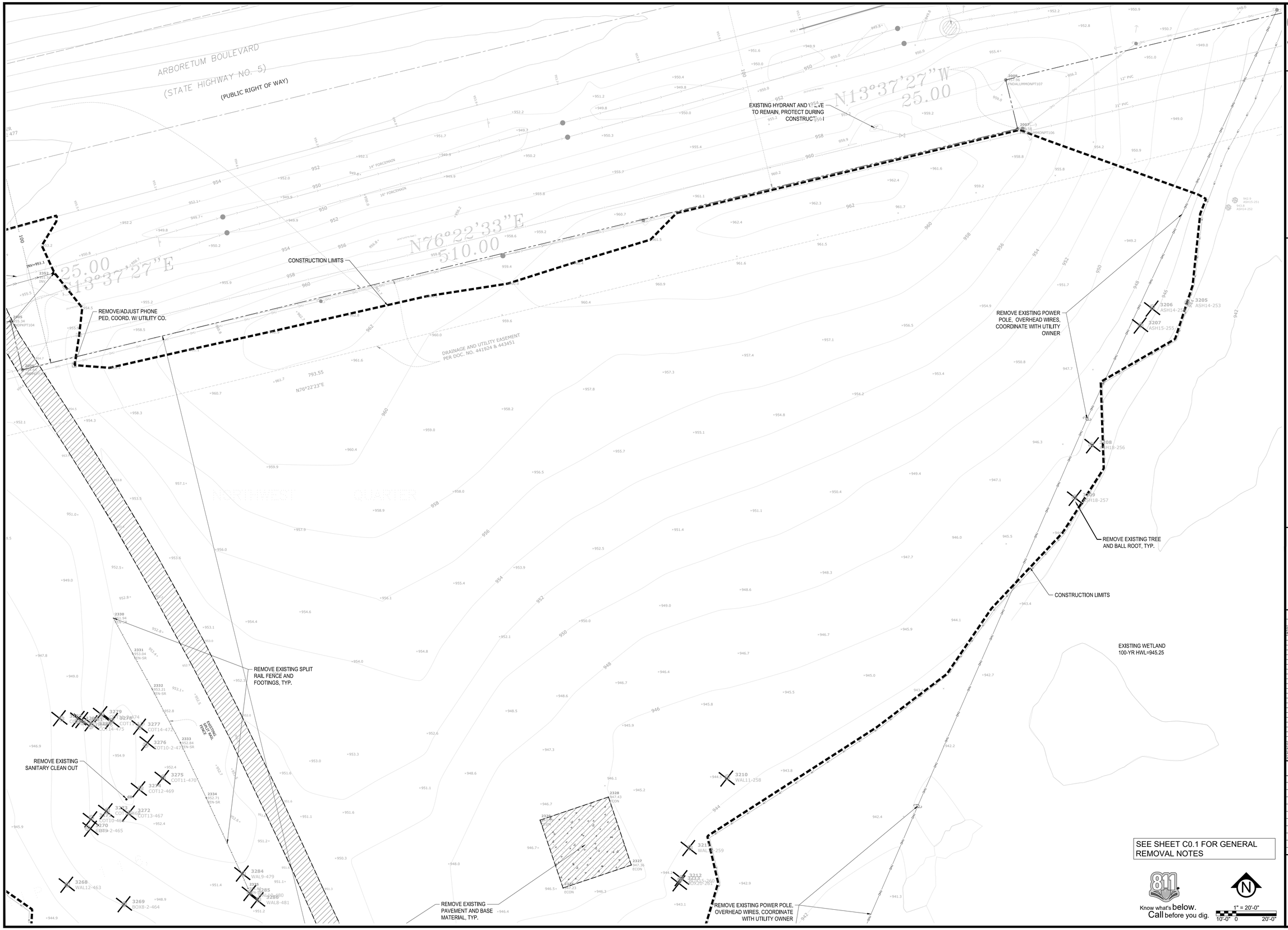
REVISION SUMMARY

DATE	DESCRIPTION

REMOVALS PLAN WEST

C1.1

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

REMOVALS PLAN NORTHEAST

C1.2

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

REMOVE EXISTING PAVEMENT AND BASE MATERIAL, TYP.

REMOVE EXISTING POWER POLE, OVERHEAD WIRES, COORDINATE WITH UTILITY OWNER

WET LAND

WATER AS ON 7/21/22

REMOVE EXISTING TREE AND BALL ROOT, TYP.

REMOVE EXISTING SATELLITE DISH CONSTRUCTION LIMITS

SATELLITE DISH

EXISTING TREES TO REMAIN, PROVIDE TREE PROTECTION FENCING, TYP.

REMOVE EXISTING PAVEMENT AND BASE MATERIAL, TYP.

REMOVE EXISTING SANITARY SEPTIC SYSTEM; MHS, CLEAN OUTS PER CITY AND STATE STANDARDS

REMOVE EXISTING WIRE FENCE AND FOOTINGS, TYP.

FILL AND CAP EXISTING WELL, PER CITY AND STATE STANDARDS

EXISTING WETLAND 100-YR HWL=945.25

REMOVE EX BUILDING, STRUCTURES, FOUNDATIONS, FOOTINGS & BASE MATERIALS, PER LOCAL STATE & FEDERAL STANDARDS. REMOVE/DISCONNECT ALL SERVICES & UTILITIES PER UTILITY COMPANY AND/OR L.G.U. STANDARDS

REMOVE EXISTING SANITARY CLEAN OUTS

REMOVE EXISTING POWER POLE, OVERHEAD WIRES, COORDINATE WITH UTILITY OWNER

REMOVE EXISTING LIGHT POLE, TYP.

SATELLITE DISH

REMOVE EXISTING SATELLITE DISH

CONSTRUCTION LIMITS

REMOVE EXISTING TREE AND BALL ROOT, TYP.

SEE SHEET C0.1 FOR GENERAL REMOVAL NOTES

Know what's below. Call before you dig.

1" = 20'-0"

10'-0" 0 20'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES

250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22600

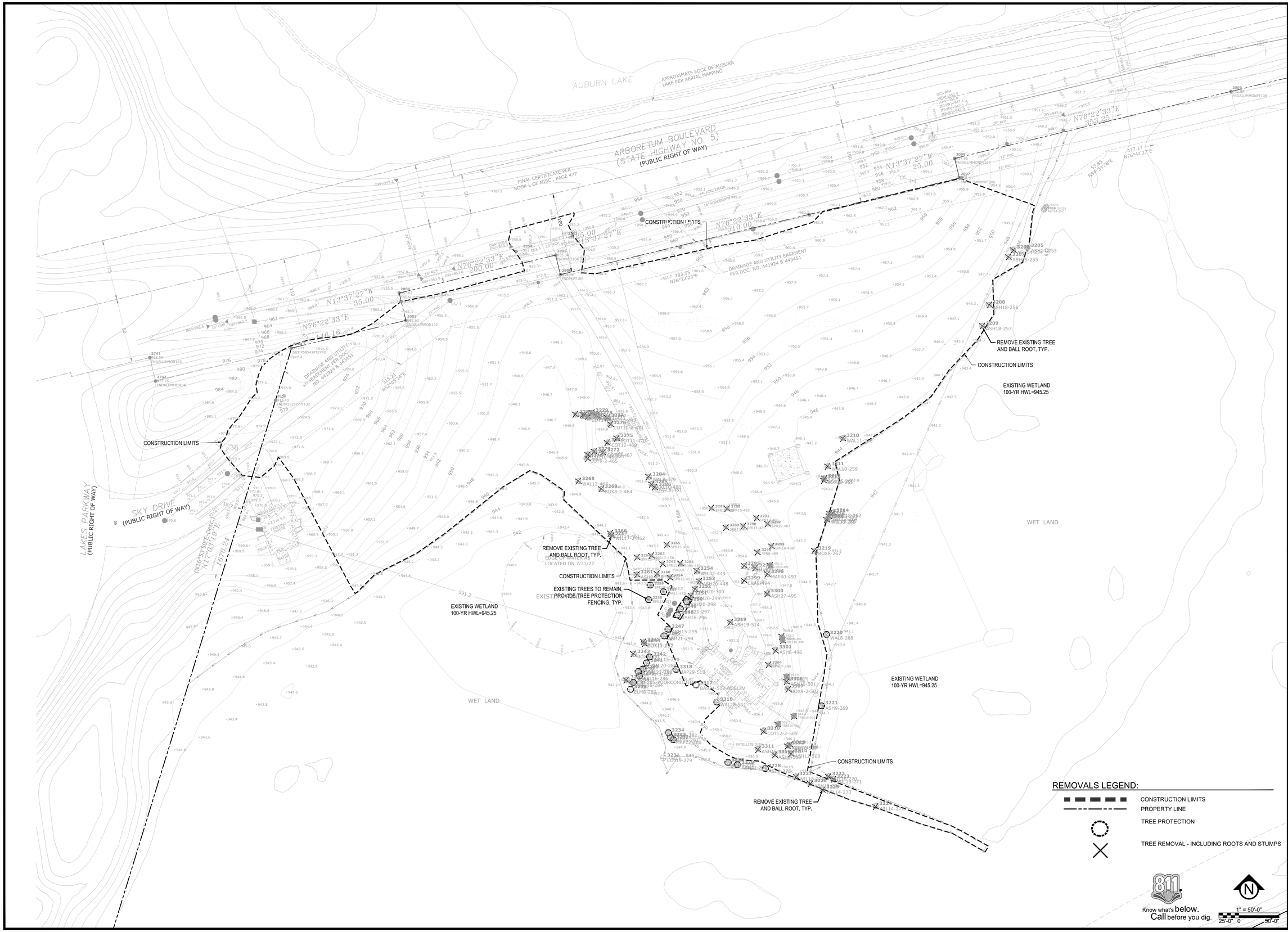
REVISION SUMMARY

DATE	DESCRIPTION

REMOVALS PLAN SOUTHEAST

C1.3

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



REMOVALS LEGEND:

- CONSTRUCTION LIMITS
- PROPERTY LINE
- TREE PROTECTION
- TREE REMOVAL - INCLUDING ROOTS AND STUMPS

Know what's below. Call before you dig.

1" = 50'-0"
25'-0" 0 50'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

TREE PRESERVATION PLAN

C1.4

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

TREE INVENTORY:

LINE NO.	TREE TAG NO. RUD	SPECIES	TRUNK SIZE (DBH")	TYPE	REMOVED	SIGNIF.*	HERITAGE
1	3203	ASH	15	D	R	X	-
2	3204	ASH	14	D	R	X	-
3	3205	ASH	14	D	R	X	-
4	3206	ASH	14	D	R	X	-
5	3207	ASH	15	D	R	X	-
6	3208	ASH	18	D	R	X	-
7	3209	ASH	18	D	R	X	-
8	3210	WALNUT	11	D	R	X	-
9	3211	WALNUT	10	D	R	X	-
18	3220	WALNUT	8	D	-	X	-
19	3221	ASH	9	D	-	X	-
24	3226	ASH	13	D	R	X	-
26	3228	ASH	9	D	-	X	-
27	3229	ASH	11	D	-	X	-
28	3230	ASH	9	D	-	X	-
29	3231	ELM	19	D	-	X	-
30	3232	MAPLE	22	D	-	X	-
31	3233	MAPLE	16	D	-	X	-
32	3234	MAPLE	28	D	-	-	X
33	3235	ELM	8	D	-	X	-
34	3236	WALNUT	16	D	-	X	-
36	3238	WALNUT	16	D	-	X	-
37	3239	MAPLE	10	D	-	X	-
38	3240	WALNUT	23	D	-	X	-
39	3241	WALNUT	20	D	-	X	-
40	3242	WALNUT	15	D	-	X	-
44	3246	ASH	21	D	-	X	-
45	3247	ASH	15	D	-	X	-
46	3248	ASH	16	D	-	X	-
47	3249	ASH	21	D	-	X	-
48	3250	ASH	20	D	-	X	-
49	3251	ASH	20	D	R	X	-
50	3252	ASH	20	D	R	X	-
51	3253	ASH	20	D	R	X	-
53	3255	SPRUCE	9	D	R	X	-
54	3256	SPRUCE	12	D	R	X	-
55	3257	SPRUCE	11	D	-	X	-
56	3258	SPRUCE	13	D	-	X	-
57	3259	SPRUCE	18	D	-	X	-
58	3260	SPRUCE	12	D	R	X	-
59	3261	ASH	8	D	R	X	-
60	3262	SPRUCE	11	D	R	X	-
61	3263	SPRUCE	17	D	R	X	-
62	3264	SPRUCE	15	D	R	X	-
63	3265	SPRUCE	15	D	R	X	-
66	3268	WALNUT	12	D	R	X	-
82	3284	WALNUT	9	D	R	X	-
83	3285	WALNUT	10	D	R	X	-
84	3286	WALNUT	8	D	R	X	-
85	3287	SPRUCE	18	D	R	X	-
86	3288	SPRUCE	15	D	R	X	-
87	3289	SPRUCE	15	D	R	X	-
88	3290	SPRUCE	11	D	R	X	-
89	3291	SPRUCE	13	D	R	X	-
90	3292	SPRUCE	15	D	R	X	-
91	3293	SPRUCE	14	D	R	X	-
92	3294	SPRUCE	8	D	R	X	-
93	3295	ASH	21	D	R	X	-
94	3296	MAPLE	22	D	R	-*	-*
95	3297	CEDAR	9	D	R	X	-
96	3298	MAPLE	40	D	R	-	X
97	3299	CRAB	8	D	R	X	-
98	3300	ASH	27	D	R	X	-
99	3301	ASH	8	D	R	X	-
100	3302	TREE	8	D	R	X	-
101	3303	TREE	10	D	R	X	-
102	3304	SPRUCE	17	D	R	X	-
103	3305	TREE	33	D	R	-	X
104	3306	ASH	10	D	R	X	-
106	3308	TREE	10	D	R	X	-
107	3309	TREE	10	D	R	X	-
108	3310	TREE	12	D	R	X	-
109	3311	ASH	15	D	R	X	-
110	3312	ASH	10	D	R	X	-
111	3313	ASH	19	D	R	X	-
112	3314	ASH	12	D	R	X	-
113	3315	ASH	9	D	R	X	-
114	3316	WALNUT	28	D	-	-	X
115	3317	BASSWOOD	24	D	-	X	-
116	3318	MAPLE	29	D	-	-	X
117	3319	ASH	19	D	R	X	-

TREE INVENTORY: EXCLUDED FROM REPLACEMENT CALCULATIONS

LINE NO.	TREE TAG NO. RUD	SPECIES	TRUNK SIZE (DBH")	TYPE	REMOVED	SIGNIF.*	HERITAGE
10	3212	BOXELDER*	15	D	R	X	-
11	3213	BOXELDER*	20	D	R	X	-
12	3214	WILLOW	15	D	R	X	-
13	3215	WILLOW	16	D	R	X	-
14	3216	WILLOW	12	D	R	X	-
15	3217	WILLOW	18	D	R	X	-
16	3218	WILLOW	30	D	R	-	X
17	3219	BOXELDER*	8	D	R	X	-
20	3222	WILLOW	16	D	R	X	-
21	3223	WILLOW	9	D	R	X	-
22	3224	WILLOW	17	D	-	X	-
23	3225	WILLOW	14	D	-	X	-
25	3227	WILLOW	18	D	-	X	-
35	3237	WILLOW	50	D	R	-	X
41	3243	BOXELDER*	8	D	R	X	-
42	3244	BOXELDER*	11	D	R	X	-
43	3245	BOXELDER*	15	D	R	X	-
52	3254	WILLOW	42	D	R	-	X
64	3266	COTTONWOOD	14	D	-	X	-
65	3267	WILLOW	17	D	-	X	-
67	3269	BOXELDER*	8	D	R	X	-
68	3270	COTTONWOOD	9	D	R	X	-
69	3271	COTTONWOOD	10	D	R	X	-
70	3272	COTTONWOOD	13	D	-	X	-
71	3273	COTTONWOOD	12	D	-	X	-
72	3274	COTTONWOOD	12	D	-	X	-
73	3275	COTTONWOOD	11	D	R	X	-
74	3276	COTTONWOOD	10	D	R	X	-
75	3277	COTTONWOOD	14	D	-	X	-
76	3278	COTTONWOOD	11	D	-	X	-
77	3279	COTTONWOOD	11	D	-	X	-
78	3280	COTTONWOOD	14	D	-	X	-
79	3281	COTTONWOOD	8	D	-	X	-
80	3282	COTTONWOOD	10	D	-	X	-
81	3283	COTTONWOOD	9	D	-	X	-
105	3307	BOXELDER*	9		-	X	-

TREE INVENTORY: REPLACEMENT CALCULATIONS

	NUMBER	CAL. IN.
Number of significant trees on-site & off-site (8"+ dia.)	75	1053
Number of heritage trees on-site & off-site (28"+ dia. decid.; 24"+ conif.)	5	158
Number of significant & heritage trees on-site & off-site	80	1211 TOTAL
	NUMBER	CAL. IN.
Number of significant trees removed on-site & off-site	51	683
Number of heritage trees removed on-site & off-site	2	73
Number of significant & heritage trees removed on-site & off-site	53	756 TOTAL REMOVED
	66.3%	62.4% % OF TOTAL TREES REMOVED
	NUMBER	CAL. IN.
Number of significant trees saved on-site & off-site	24	370
Number of heritage trees saved on-site & off-site	3	85
Number of significant & heritage trees saved on-site & off-site	27	455 TOTAL SAVED
	33.8%	37.6% % OF TOTAL TREES SAVED
	%	CAL. IN.
Actual % of significant & heritage trees removed on-site & off-site (by cal.in.)	62.4%	756
Allowable % of significant & heritage trees that can be removed without replacement	20.0%	242
Actual removal % that exceeds allowable removal %	42.4%	514
Net cal. in of removed significant & heritage trees that requires replacement obligation		514
		CAL. IN.
Cal. in. of replacement obligation, heritage trees		73
Cal. in. of replacement obligation, significant trees		441
Cal. in. of replacement trees, per heritage tree obligation at 2:1		146
Cal. in. of replacement trees, per significant tree obligation at 1:1		441
Total cal. in. of required replacement trees		587
		CAL. IN.
1:1 credit for all heritage trees saved (cal. in.)		85
1:1 credit for saving a "significant woodland" (cal. in.) (assume all trees saved make up a "signficant woodland")		455
Total heritage tree & significant woodland credit		540
Max. heritage tree & significant woodland credit at 50% of total req. replacement trees		293
NET CAL. IN. OF REQUIRED REPLACEMENT TREES (AFTER CREDITS)		**293**
REQD. NO. OF 3" REPLACEMENT TREES (AFTER CREDITS)		**98**
NET FINAL REQD. NO. OF 3" REPLACEMENT TREES		

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

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

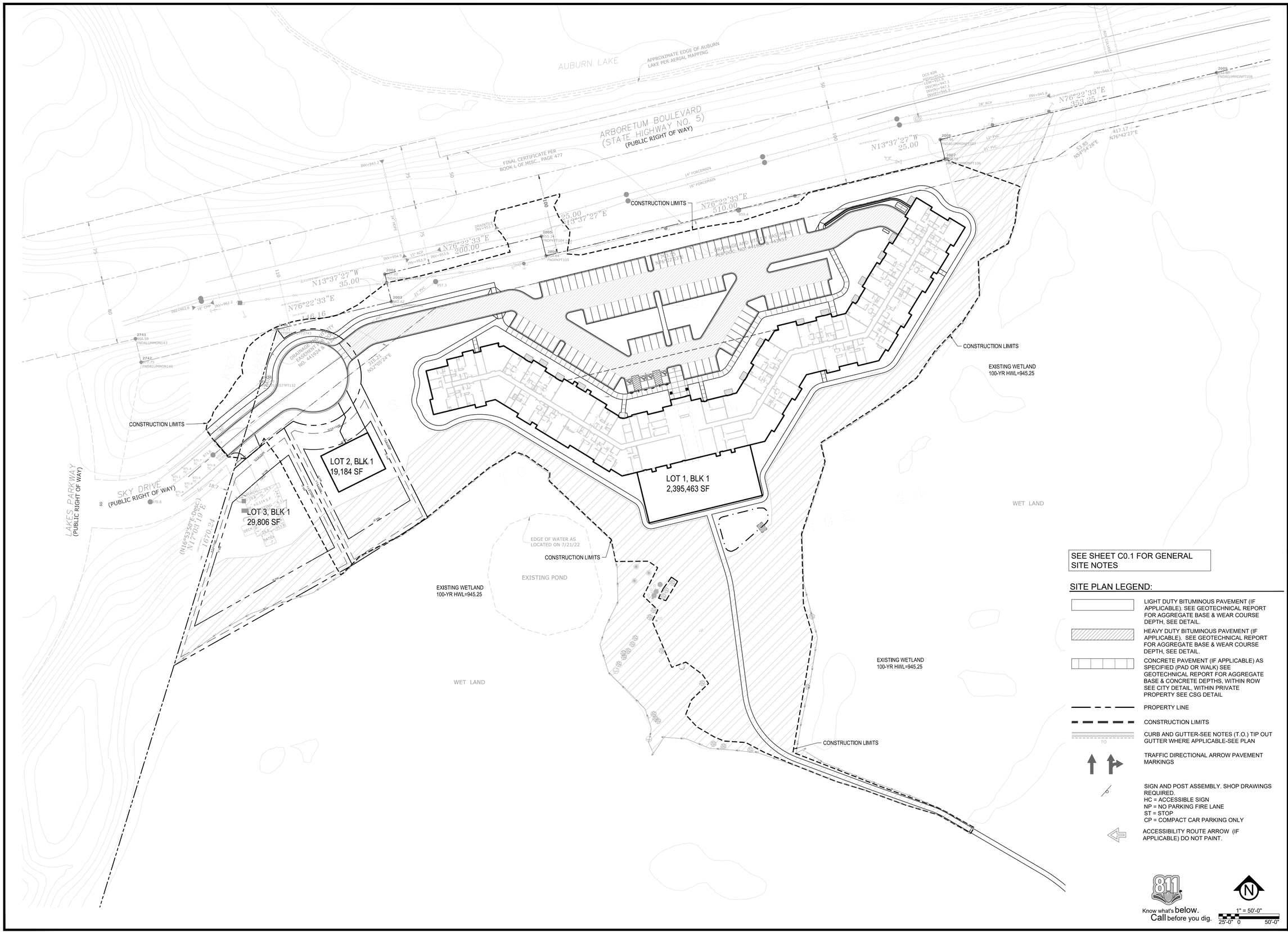
REVISION SUMMARY

DATE	DESCRIPTION

TREE PRESERVATION PLAN: TREE LIST AND REQUIREMENTS

C1.5

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



SEE SHEET C0.1 FOR GENERAL SITE NOTES

SITE PLAN LEGEND:

- LIGHT DUTY BITUMINOUS PAVEMENT (IF APPLICABLE). SEE GEOTECHNICAL REPORT FOR AGGREGATE BASE & WEAR COURSE DEPTH, SEE DETAIL.
- HEAVY DUTY BITUMINOUS PAVEMENT (IF APPLICABLE). SEE GEOTECHNICAL REPORT FOR AGGREGATE BASE & WEAR COURSE DEPTH, SEE DETAIL.
- CONCRETE PAVEMENT (IF APPLICABLE) AS SPECIFIED (PAD OR WALK) SEE GEOTECHNICAL REPORT FOR AGGREGATE BASE & CONCRETE DEPTHS, WITHIN ROW SEE CITY DETAIL, WITHIN PRIVATE PROPERTY SEE CSG DETAIL
- PROPERTY LINE
- CONSTRUCTION LIMITS
- CURB AND GUTTER-SEE NOTES (T.O.) TIP OUT GUTTER WHERE APPLICABLE-SEE PLAN
- TRAFFIC DIRECTIONAL ARROW PAVEMENT MARKINGS
- SIGN AND POST ASSEMBLY. SHOP DRAWINGS REQUIRED.
  HC = ACCESSIBLE SIGN
  NP = NO PARKING FIRE LANE
  ST = STOP
  CP = COMPACT CAR PARKING ONLY
- ACCESSIBILITY ROUTE ARROW (IF APPLICABLE) DO NOT PAINT.

Know what's below. Call before you dig.

1" = 50'-0"
25'-0" 0 50'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
02/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

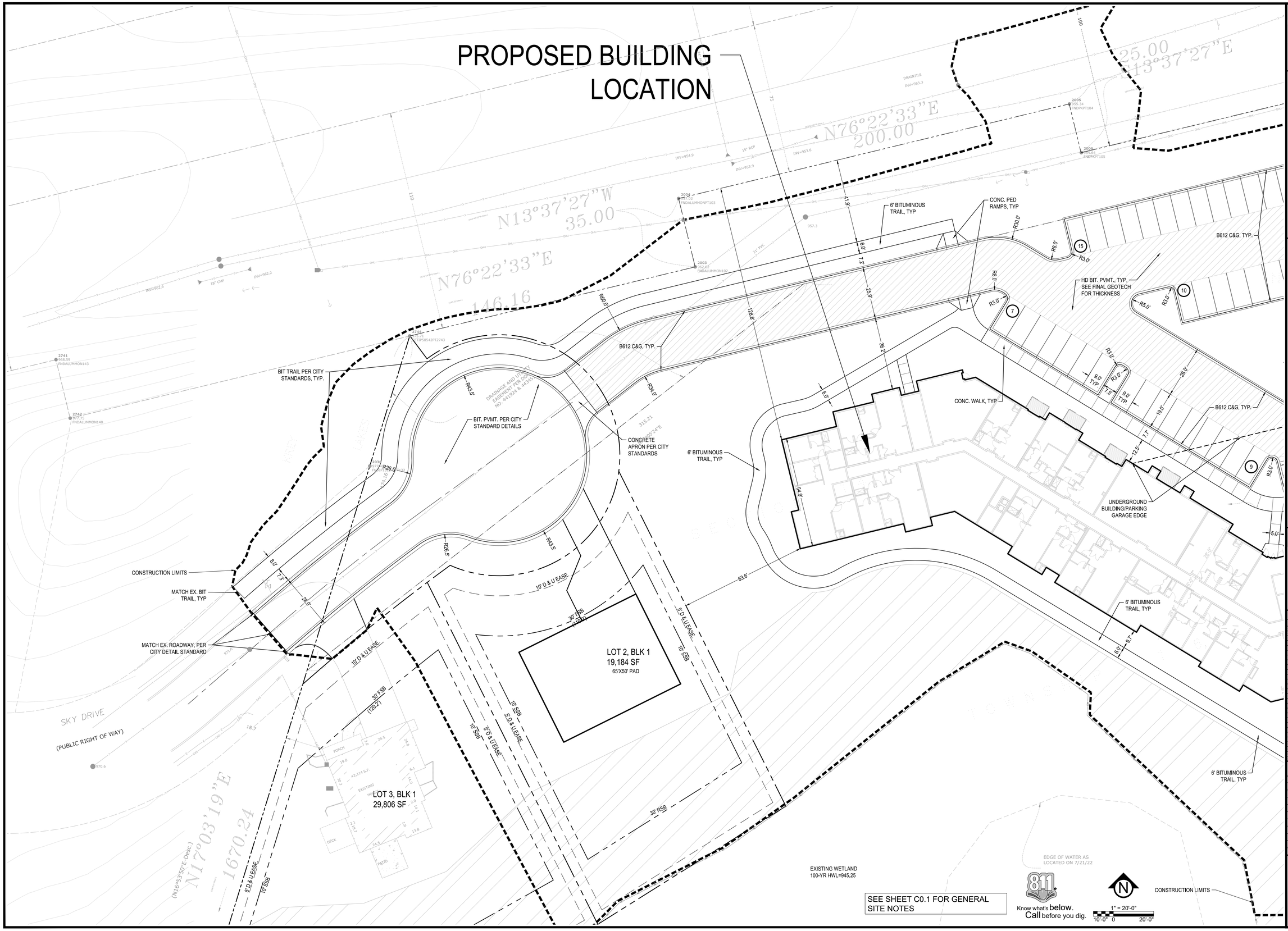
REVISION SUMMARY

DATE	DESCRIPTION

SITE PLAN OVERALL

C2.0

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

SITE PLAN WEST

C2.1

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

SEE SHEET C0.1 FOR GENERAL SITE NOTES

Know what's below. Call before you dig.

1" = 20'-0"
10'-0" 0 20'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

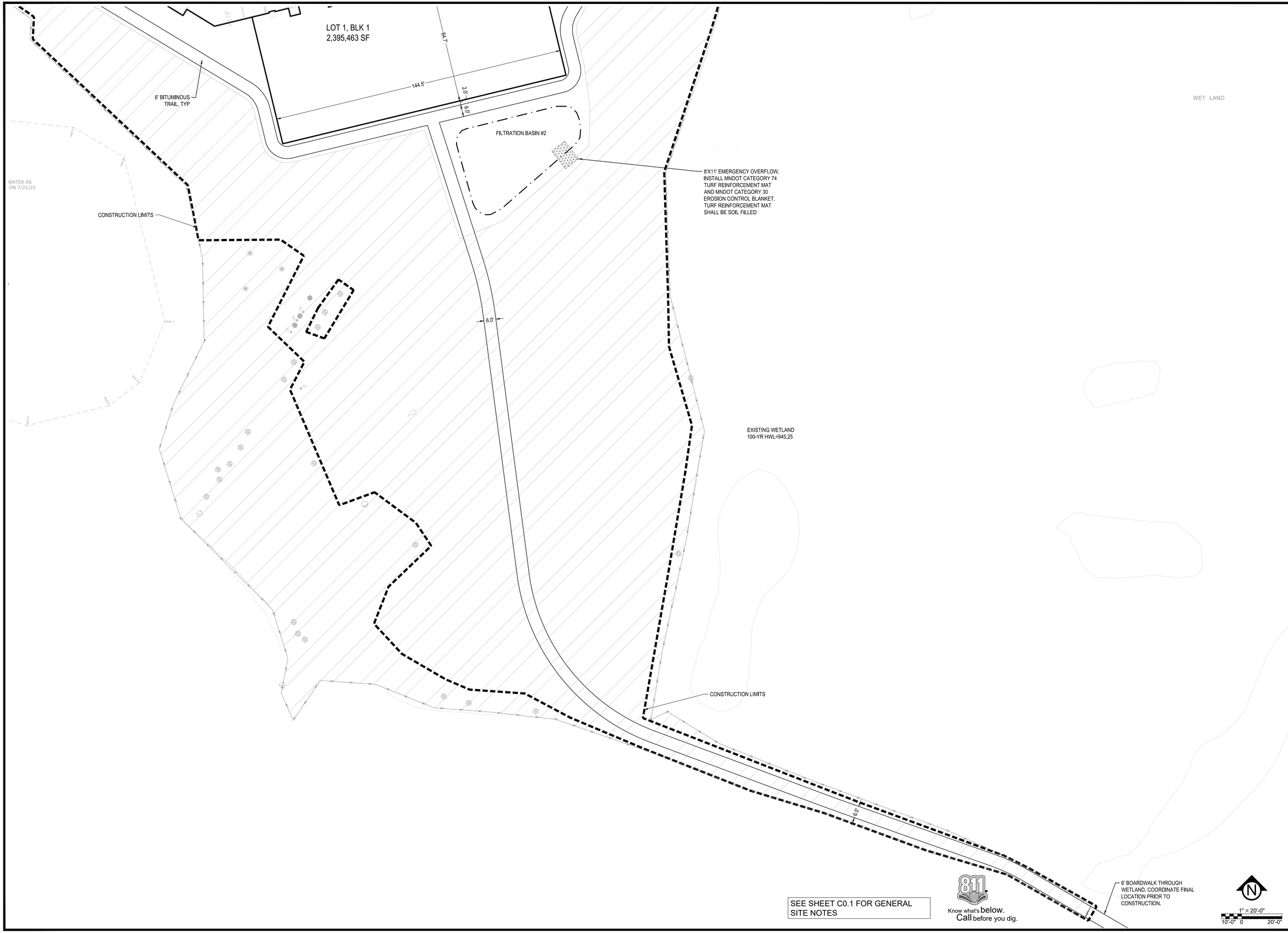
REVISION SUMMARY

DATE	DESCRIPTION

SITE PLAN NORTHEAST

C2.2

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

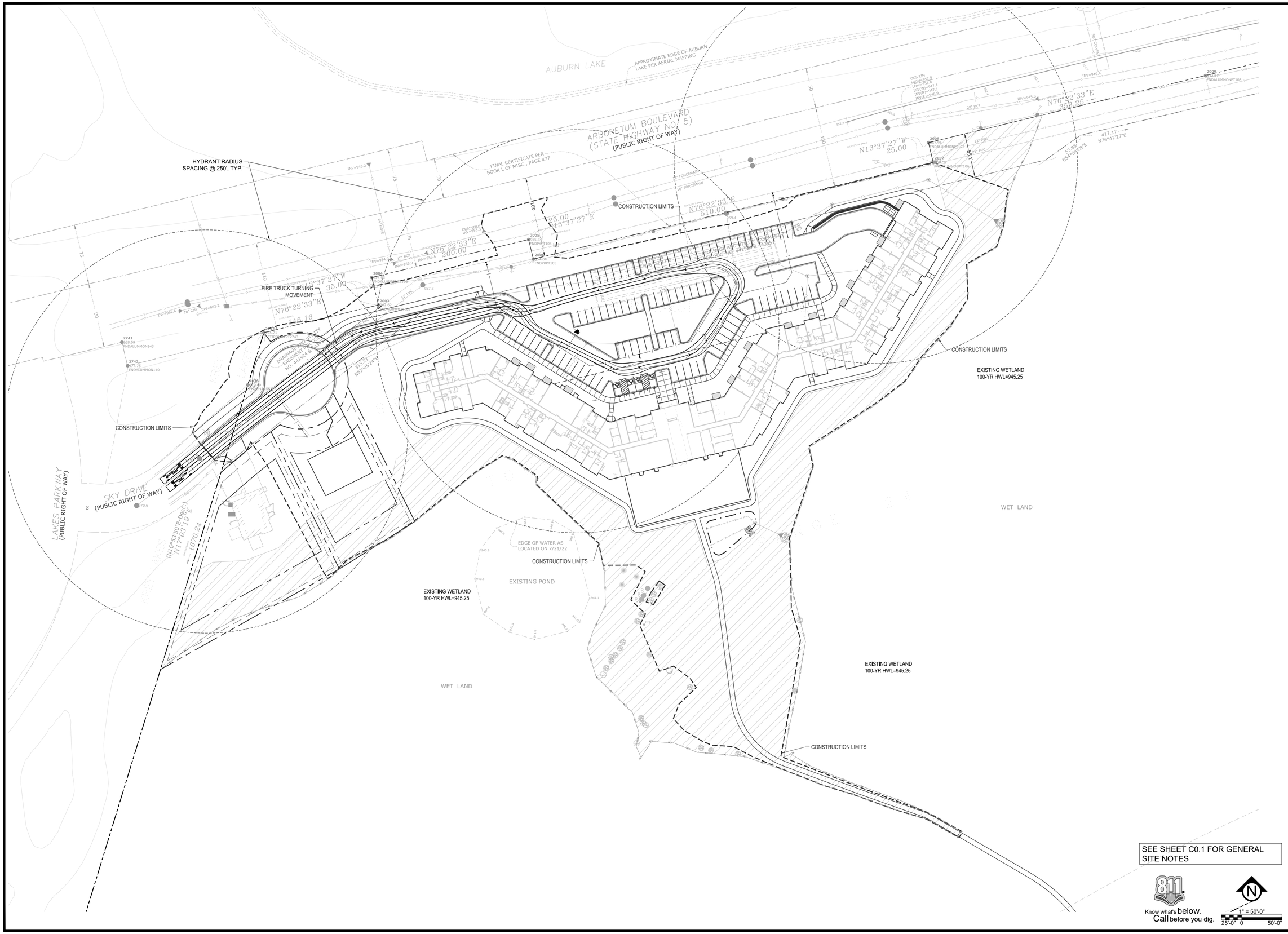
REVISION SUMMARY

DATE	DESCRIPTION

SITE PLAN SOUTHEAST

C2.3

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



SEE SHEET C0.1 FOR GENERAL SITE NOTES

Know what's below. Call before you dig.

N

1" = 50'-0"
25'-0" 0 50'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

TURNING MOVEMENT AND HYDRANT SPACING PLAN

C2.4

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

LEGEND:

- 75' AVERAGE WETLAND BUFFER AREA
- PROPOSED WETLAND BUFFER AREA
- PROPOSED WETLAND BUFFER AREA LESS THAN 37.5' MIN.
- PROPERTY LINE
- CONSTRUCTION LIMITS

Know what's below. Call before you dig.

1" = 50'-0"
25'-0" 0 50'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL
7/10/2023	CITY RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

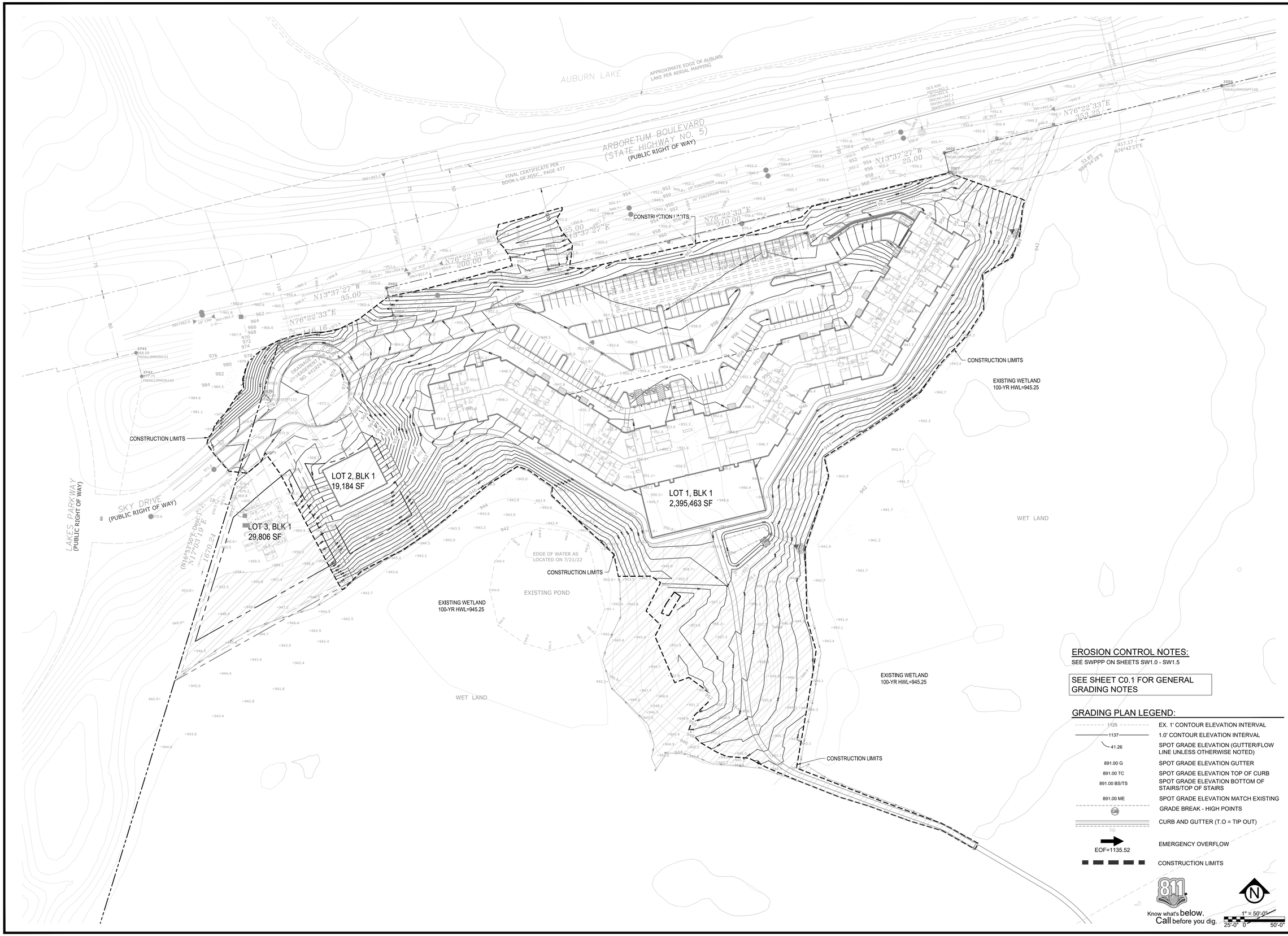
REVISION SUMMARY

DATE	DESCRIPTION

WETLAND BUFFER PLAN

C2.5

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



EROSION CONTROL NOTES:

SEE SWPPP ON SHEETS SW1.0 - SW1.5

SEE SHEET C0.1 FOR GENERAL GRADING NOTES

GRADING PLAN LEGEND:

1125	EX. 1' CONTOUR ELEVATION INTERVAL
1137	1.0' CONTOUR ELEVATION INTERVAL
41.26	SPOT GRADE ELEVATION (GUTTER/FLOW LINE UNLESS OTHERWISE NOTED)
891.00 G	SPOT GRADE ELEVATION GUTTER
891.00 TC	SPOT GRADE ELEVATION TOP OF CURB
891.00 BS/TS	SPOT GRADE ELEVATION BOTTOM OF STAIRS/TOP OF STAIRS
891.00 ME	SPOT GRADE ELEVATION MATCH EXISTING
GB	GRADE BREAK - HIGH POINTS
TO	CURB AND GUTTER (T.O = TIP OUT)
EOF=1135.52	EMERGENCY OVERFLOW
	CONSTRUCTION LIMITS

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

1" = 50'-0"
25'-0" 0 50'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES

250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

GRADING PLAN OVERALL

C3.0

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

GRADING PLAN WEST

C3.1

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

SEE SHEET C0.1 FOR GENERAL GRADING NOTES

Know what's below. Call before you dig.

1" = 20'-0"
10'-0" 0 20'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

GRADING PLAN NORTHEAST

C3.2

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

SEE SHEET C0.1 FOR GENERAL GRADING NOTES

Know what's below. Call before you dig.

1" = 20'-0"
10'-0" 0 20'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

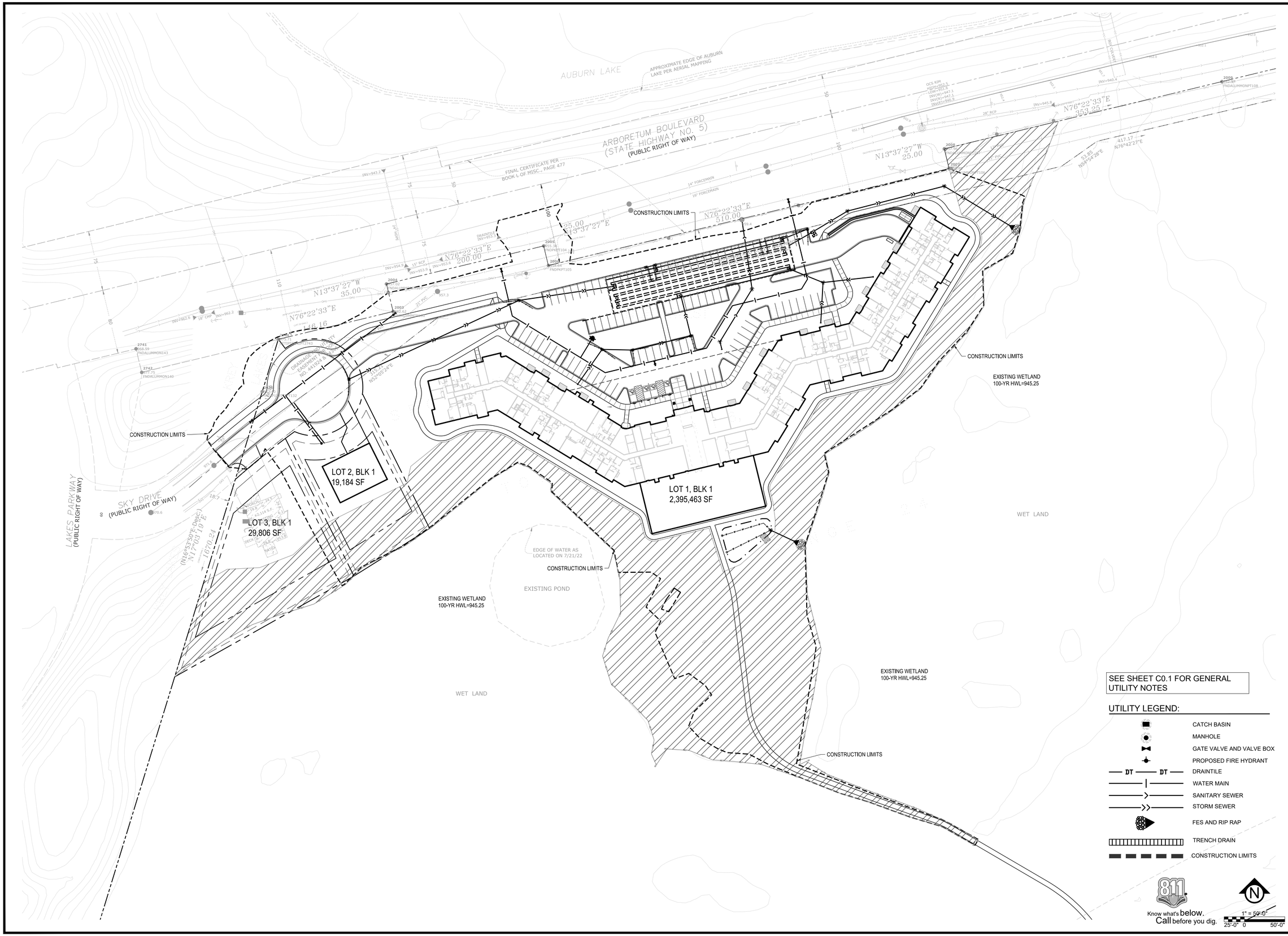
REVISION SUMMARY

DATE	DESCRIPTION

GRADING PLAN
SOUTHEAST

C3.3

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

UTILITY PLAN OVERALL

C4.0

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

UNDERGROUND RATE CONTROL BASIN 1
60" PERF. CMP UNDERGROUND
STORAGE SYSTEM
12" SIDE & END STONE, 30" STONE
SEPARATION, 6" STONE COVER
IE 60" CMP=949.25
OE 15" ORIFICE=949.25
TOP 60" CMP=954.25
TOP STONE=954.75
BAFFLE ELEV.=951.25
100-YR HWL=954.72

MAKE WET TAP CONNECTION
TO EXISTING 12" WATER MAIN.
COORD. W/ CITY.

ADJUST EX. SANMH
EX. RE= 957.30
PROP. RE=960.00
EX. IE(SW)=944.17
EX. IN(E)=944.07

PROPOSED 8" GATE
VALVE & VALVE BOX

CBMH 41
RIM=959.88
IE=955.10
SUMP=951.10
INSTALL SAFL BAFL
AND HOOD

119 LF 18" HDPE
STORM @ 0.50%

UTILITY CROSSING.
MAINTAIN 18" MINIMUM
COVER. LOWER AND
INSULATE WATERMAIN
AS NEEDED, TYP.

CONNECT TO EXISTING
12" WATER MAIN
PROPOSED 12" GATE
VALVE & VALVE BOX

18" INLET (RISER)
IE=954.50
BAFFLE WALL, TYP.
TOP=951.25

ACCESS RISER,
TYP.

INSTALL 20 LF 4" DT
BELOW CLASS V
LAYER, TYP.

232 LF 18" RCP
STORM @ 3.78%

8" PVC C900
WATERMAIN

6" PVC PERF. DRAIN
TILE @ 0.00%, TYP.

HYD & GV, TYP.

37 LF 15" HDPE
STORM @ 0.50%

12" C900 DR18
WATER MAIN

8x6 TEE

CBMH 33
RIM=960.08
IE=955.32

CONNECT TO EXISTING
12" WATER MAIN
PROPOSED 12" GATE
VALVE & VALVE BOX

CB 42
RIM=967.87
IE=963.87

SEE DEMO PLAN
FOR ALL EXISTING
UTILITY REMOVAL
INFORMATION

CONTRACTOR SHALL COORDINATE ALL
THE UTILITY SERVICES WITH BOTH THE
CIVIL AND MECHANICAL PLANS PRIOR TO
CONSTRUCTION.

12" BLDG STORM
SERVICE, STUB TO
WITHIN 5' FROM
BUILDING, COORD.
W/MECH'L
STUB IE=955.37

1" PE WATER
SERVICE PER CITY
STANDARDS

62 LF 4" PVC SCH40
SAN. SERV. @ 2.00%

53 LF 12" SCH.40
STORM @ 1.00%

CONSTRUCTION LIMITS

LOT 2, BLK 1
19,184 SF

SKY DRIVE
(PUBLIC RIGHT OF WAY)

LOT 3, BLK 1
29,806 SF

EXISTING WETLAND
100-YR HWL=945.25

EDGE OF WATER AS
LOCATED ON 7/21/22

SEE SHEET C0.1 FOR GENERAL
UTILITY NOTES

Know what's below.
Call before you dig.

1" = 20'-0"
10'-0" 0 20'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
0/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

UTILITY PLAN WEST

C4.1

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

ARBORETUM BOULEVARD
(STATE HIGHWAY NO. 5)
(PUBLIC RIGHT OF WAY)

N13°37'27"W
25.00

MAKE WET TAP CONNECTION TO EXISTING 12" WATER MAIN, COORD. W/ CITY

PROPOSED GATE VALVE & VALVE BOX

CB 11
RIM=957.91
IE=954.68
SUMP=950.68
INSTALL SAFL BAFL AND HOOD

MH 2
RIM=956.05
IE=945.75

MH 3
RIM=957.37
IE=946.71

123 LF 18" HDPE STORM @ 0.75%

100 LF 18" HDPE STORM @ 0.75%

FES 1
IE=945.00
INSTALL MNDOT CLASS III RIP RAP

MAKE CORE-DRILL CONNECTION TO EXISTING SANITARY SEWER 54" MH
EX RIM=958.82
EX IE (W)=943.35 (FIELD VERIFY)
EX IE (E)=943.25 (FIELD VERIFY)
PROP IE (S)=943.35
COORD. W/ CITY

35 LF 18" SCH40 STORM @ 0.50%

48LF 18" HDPE STORM @ 0.75%

UNDERGROUND RATE CONTROL BASIN 1
60" PERF. CMP UNDERGROUND STORAGE SYSTEM
12" SIDE & END STONE, 30" STONE SEPARATION, 6" STONE COVER
IE 60" CMP=949.25
OE 15" ORIFICE=949.25
TOP 60" CMP=954.25
TOP STONE=954.75
BAFFLE ELEV.=951.25
100-YR HWL=954.72

CONSTRUCTION LIMITS

12 LF 18" HDPE STORM @ 0.50%

CBMH 51
RIM=958.00
IE=954.53
SUMP=950.53
INSTALL SAFL BAFL AND HOOD

CB 52
RIM=958.00
IE=954.59

18" INLET (RISER)
IE=954.50

87 LF 8" PVC SDR 26 SANITARY SERVICE @ 1.00%

STORMFILTER W/ PHOSPHOSORB
6'X8' VAULT
RIM=958.73
IE (NE)=947.07
IE (SW)=949.10
WEIR=952.10

31 LF 18" SCH40 STORM @ 0.50%

6 LF 18" HDPE STORM @ 0.50%

18" INLET (RISER)
IE=954.50

15" OUTLET
IE=949.25

HYD & GV, TYP.

TRENCH DRAIN
RIM=951.38
BOT=949.38
CONNECT TO INTERIOR BUILDING MECH'L PUMP, SEE MECH'L PLANS
100-YR FLOW=0.XX CFS
XXXX SF

46 LF 12" SCH40 STORM @ 0.50%

12" BLDG STORM SERVICE, STUB TO WITHIN 5' FROM BUILDING, COORD. W/MECH'L
STUB IE=955.36

119 LF 18" HDPE STORM @ 0.50%

8x6 TEE

12" INLET (RISER)
IE=954.50

18" INLET (RISER)
IE=954.50

BAFFLE WALL, TYP.
TOP=951.25

SANMH 01
RE= 959.72
IE(N)=944.22
IE(SW)=944.32

MH 21
RIM=960.11
IE=954.73
SUMP=950.73
INSTALL SAFL BAFL AND HOOD

63 LF 12" SCH.40 STORM @ 1.00%

8" PVC C900 WATERMAIN

DRAW DOWN RISER, TYP.

ACCESS RISER, TYP.

18" INLET (RISER)
IE=954.50

CONSTRUCT ALL WATER MAIN PER CITY OF VICTORIA STANDARDS AND SPECIFICATIONS

51 LF 18" HDPE STORM @ 0.50%

CBMH 31
RIM=959.76
IE=954.76
SUMP=950.76
INSTALL SAFL BAFL AND HOOD

8" PVC C900 WATERMAIN

CBMH 32
RIM=959.98
IE=955.13

6" PVC PERF. DRAIN TILE @ 0.00%, TYP.

12" BLDG STORM SERVICE, STUB TO WITHIN 5' FROM BUILDING, COORD. W/MECH'L
STUB IE=955.23

50 LF 12" SCH.40 STORM @ 1.00%

37 LF 15" HDPE STORM @ 0.50%

74 LF 15" HDPE STORM @ 0.50%

SANMH 02
RE=960.19
IE(NE)=945.08
IE(S)=945.18

SEE DEMO PLAN FOR ALL EXISTING UTILITY REMOVAL INFORMATION

HYD & GV, TYP.
8" TEE

76 LF 8" PVC SDR 26 SANITARY SERVICE @ 1.00%

CONSTRUCTION LIMITS

CBMH 33
RIM=960.08
IE=955.32

10 LF 8" PVC SDR 26 SANITARY SERVICE @ 1.00%

CONTRACTOR SHALL COORDINATE ALL THE UTILITY SERVICES WITH BOTH THE CIVIL AND MECHANICAL PLANS PRIOR TO CONSTRUCTION.

8x6 TEE

INSTALL 20 LF 4" DT BELOW CLASS V LAYER, TYP.

STUB 8" SANITARY TO 5' FROM BUILDING
IE @ STUB=945.28
COORD. W/ MECH'L

PROPOSED 8" GATE VALVE & VALVE BOX

8" COMBINED DIP WATER SERVICE AND VALVE, STUB TO WITHIN 5' FROM BUILDING, COORD. W/ MECH'L

EXISTING WETLAND
100-YR HWL=945.25

12" BLDG STORM SERVICE, STUB TO WITHIN 5' FROM BUILDING, COORD. W/MECH'L
STUB IE=955.37

53 LF 12" SCH.40 STORM @ 1.00%

FIRE DEPARTMENT CONNECTION, COORD. W/MECH'L

LOT 1, BLK 1

DOWNSPOUT

SEE SHEET C0.1 FOR GENERAL UTILITY NOTES

Know what's below. Call before you dig.

N

1" = 20'-0"
10'-0" 0 20'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

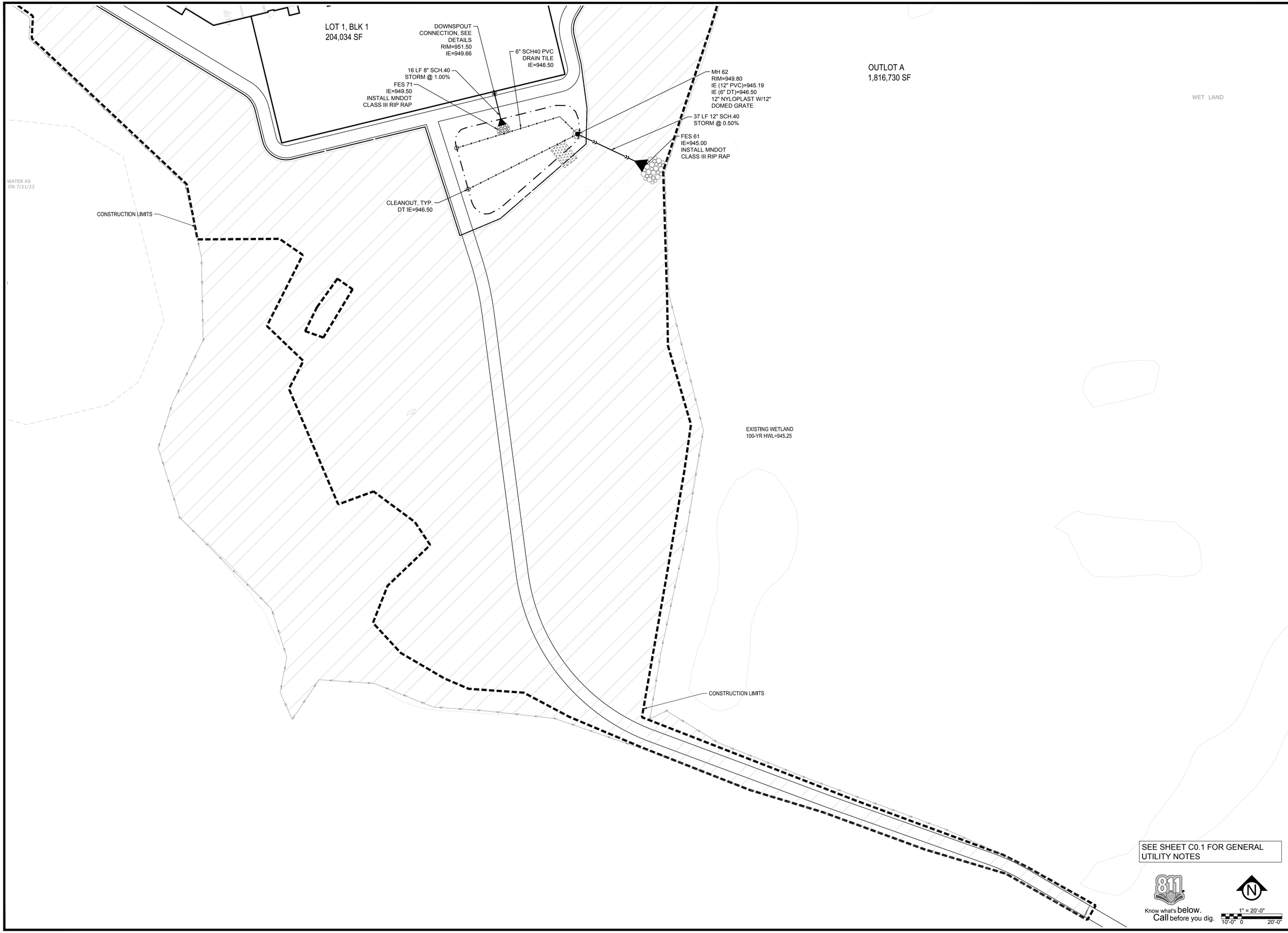
REVISION SUMMARY

DATE	DESCRIPTION

UTILITY PLAN NORTHEAST

C4.2

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



SEE SHEET C0.1 FOR GENERAL UTILITY NOTES

Know what's below. Call before you dig.

1" = 20'-0"
10'-0" 0 20'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

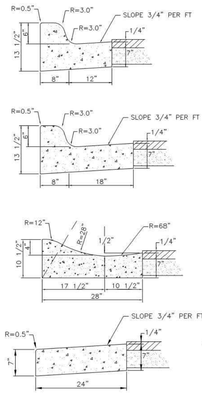
REVISION SUMMARY

DATE	DESCRIPTION

UTILITY PLAN SOUTHEAST

C4.3

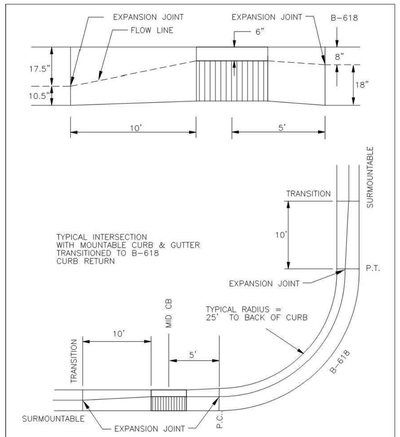
© COPYRIGHT 2023 CIVIL SITE GROUP INC.



CONCRETE CURB & GUTTER

FEBRUARY 2022

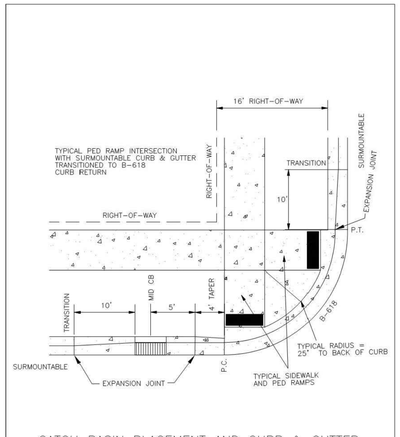
CITY OF VICTORIA | STANDARD DRAWING NO. 501 Victoria



CATCH BASIN PLACEMENT AND CURB & GUTTER TRANSITION AT INTERSECTIONS

FEBRUARY 2022

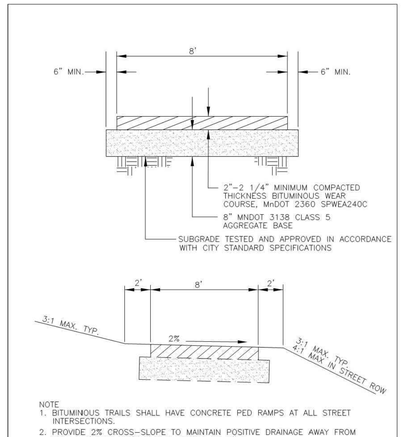
CITY OF VICTORIA | STANDARD DRAWING NO. 507 Victoria



CATCH BASIN PLACEMENT AND CURB & GUTTER TRANSITION AT INTERSECTIONS WITH PEDESTRIAN RAMPS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 508 Victoria

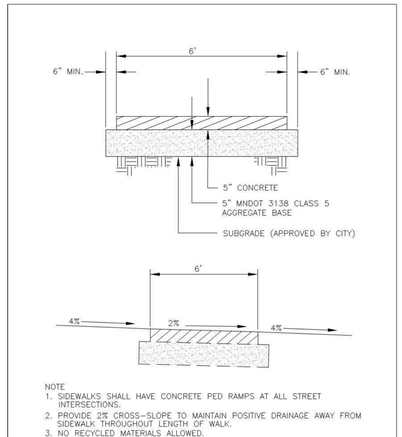


NOTE
1. BITUMINOUS TRAILS SHALL HAVE CONCRETE PED RAMPS AT ALL STREET INTERSECTIONS.
2. PROVIDE 2% CROSS-SLOPE TO MAINTAIN POSITIVE DRAINAGE AWAY FROM TRAIL SURFACE THROUGHOUT LENGTH OF TRAIL.

BICYCLE-PEDESTRIAN PATH

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 509 Victoria

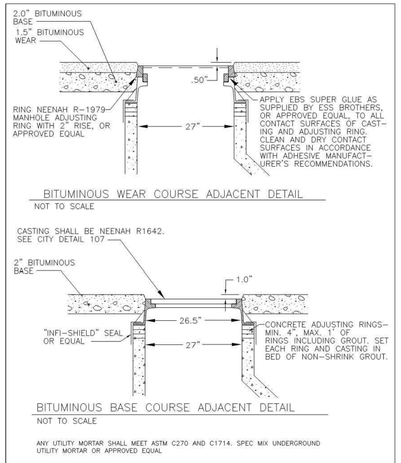


NOTE
1. SIDEWALKS SHALL HAVE CONCRETE PED RAMPS AT ALL STREET INTERSECTIONS.
2. PROVIDE 2% CROSS-SLOPE TO MAINTAIN POSITIVE DRAINAGE AWAY FROM SIDEWALK THROUGHOUT LENGTH OF WALK.
3. NO RECYCLED MATERIALS ALLOWED.

CONCRETE SIDEWALK

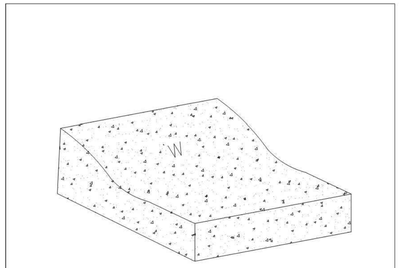
FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 510 Victoria



FEBRUARY 2022 MANHOLE CASTING ADJUSTMENT

CITY OF VICTORIA | STANDARD DRAWING NO. 511 Victoria



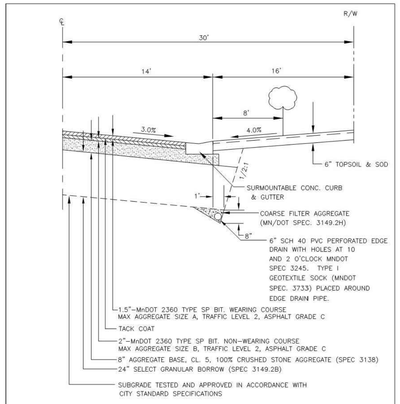
W – RELATIVE CURB STOP LOCATION
CB – RELATIVE DRAINTILE CLEANOUT LOCATION
SP – RELATIVE SUMP PUMP STUB LOCATION
S – RELATIVE SANITARY SEWER SERVICE STUB LOCATION

NOTES:
1. CURB MARKERS ARE AVAILABLE FROM CITY HALL.
2. CURB MARKINGS SHALL BE POSITIONED IN THE FACE OF THE CURB, WHILE THE CONCRETE IS IN A PLASTIC STATE, PERPENDICULAR TO THE LOCATION OF CURB STOPS AND DRAINTILE CLEAN OUTS.
3. WHERE B6 CURB IS USED, PLACE CURB MARKING ON FACE OF CURB.

CONCRETE CURB MARKING

FEBRUARY 2022

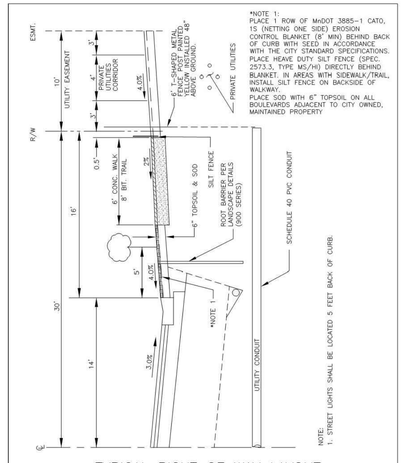
CITY OF VICTORIA | STANDARD DRAWING NO. 513 Victoria



TYPICAL RESIDENTIAL STREET SECTION

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 801 Victoria



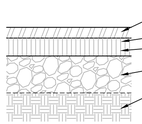
TYPICAL RIGHT OF WAY LAYOUT

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 805 Victoria

GENERAL DETAILS NOTES:

CONTRACTOR SHALL REVIEW ALL CIVIL AND ARCHITECTURAL DETAILS PRIOR TO WORK. ANY REDUNDANT, CONTRADICTORY OR CONFLICTING INFORMATION PRESENTED IN ANY PLAN OR DETAIL THROUGHOUT THE CONTRACT DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE PROJECT ARCHITECT AND CIVIL ENGINEER AND RESOLVED PRIOR TO WORK COMMENCING.

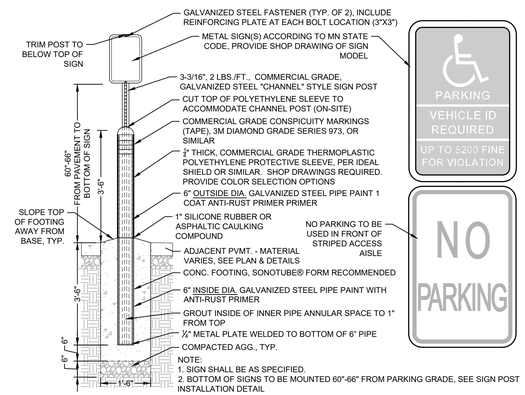


PAVEMENT DESIGN

TYPE	WEAR (A)	BASE (B)	AGG.(C)
LIGHT DUTY	1.5"	2.0"	8"
HEAVY DUTY	2.0"	2.0"	10"

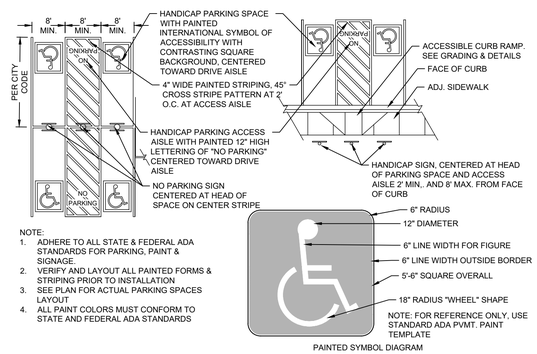
NOTE:
IF NO DESIGN IS DEFINED IN ABOVE CHART, SEE GEOTECH REPORT FOR FINAL PAVEMENT SECTION.
IF DESIGN IS DEFINED IN ABOVE CHART, IT SHOULD BE CONSIDERED FOR BIDDING PURPOSES ONLY. REFER TO GEOTECH FOR FINAL PAVEMENT SECTION.

1 BITUMINOUS PAVEMENT - ALL TYPES
NTS



NOTE:
1. SIGN SHALL BE AS SPECIFIED.
2. BOTTOM OF SIGNS TO BE MOUNTED 60"-66" FROM PARKING GRADE, SEE SIGN POST INSTALLATION DETAIL
3. VERIFY POST PAINT COLOR WITH LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

2 ACCESSIBLE SIGN & CHANNEL POST - LOT LOCATION
NTS



NOTE:
1. ADHERE TO ALL STATE & FEDERAL ADA STANDARDS FOR PARKING, PAINT & SIGNAGE.
2. VERIFY AND LAYOUT ALL PAINTED FORMS & STRIPING PRIOR TO INSTALLATION
3. SEE PLAN FOR ACTUAL PARKING SPACES LAYOUT
4. ALL PAINT COLORS MUST CONFORM TO STATE AND FEDERAL ADA STANDARDS

3 ACCESSIBLE PARKING PAVEMENT MARKING
NTS

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

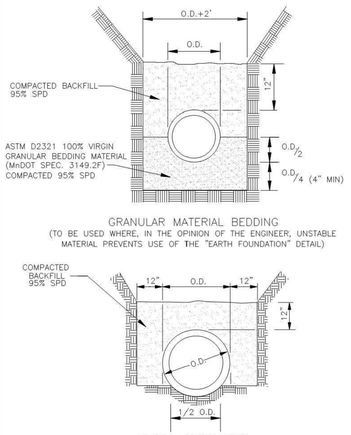
REVISION SUMMARY

DATE	DESCRIPTION

CIVIL DETAILS

C5.0

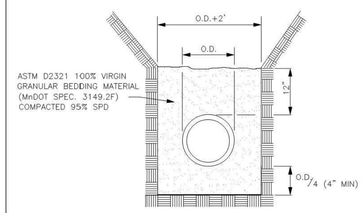
© COPYRIGHT 2023 CIVIL SITE GROUP INC.



PIPE FOUNDATION DETAILS

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 101 Victoria

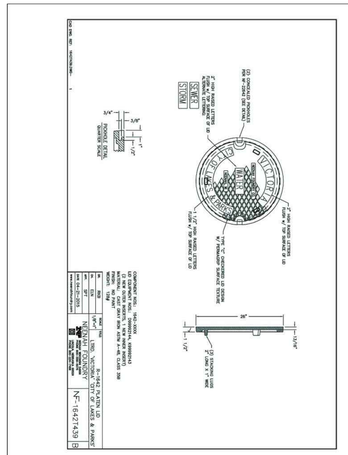


NOTE: PIPE ZONE COMPACTION PER MNDOT 2105.3F1 SPECIFIED DENSITY METHOD. 95% SPD MINIMUM.

GRANULAR MATERIAL BEDDING METHOD
(FOR PLASTIC PIPE)

FEBRUARY 2022

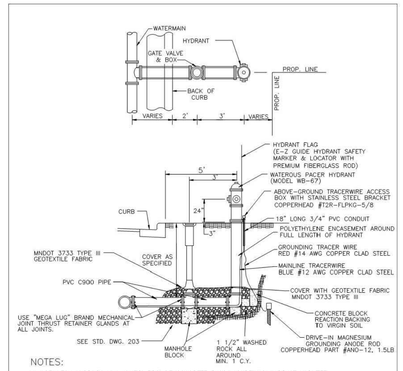
CITY OF VICTORIA | STANDARD DRAWING NO. 103 Victoria



R-1642 SPECIALIZED MANHOLE COVER

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 107 Victoria



NOTES:

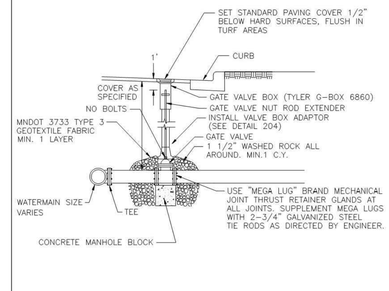
1. USE MEGA LUGS ON ALL JOINTS. PROVIDE CONCRETE BLOCKING BEHIND HYDRANT AND TEE. USE COR-BLUE T BOLTS ON ALL FITTINGS.
2. PLUG WEEP HOLES IF GROUNDWATER IS PRESENT.
3. IF WEEP HOLES ARE PLUGGED, PUMPER NOZZLE CAP MUST BE PAINTED BLUE AND A TAG SHALL BE ATTACHED TO THE HYDRANT STATING "DRAIN HOLES PLUGGED".
4. SUPPLY 1 EXTRA FLAG FOR EVERY 5 HYDRANTS INSTALLED. MINIMUM ONE PER PROJECT.
5. SUPPLY 1 HYDRANT WRENCH OR HYDRANT REPAIR KIT PER PROJECT, AS DIRECTED BY THE ENGINEER.
6. SUPPLY 1 6" HYDRANT EXTENSION OR 1 EXTRA GATE VALVE NUT ROD EXTENDER PER PROJECT, AS DIRECTED BY THE ENGINEER.
7. ALL HYDRANTS INOT IN SERVICE SHALL BE COVERED WITH BLACK POLY PLASTIC.

**EXTRA FLAGS AND REPAIR KITS ARE TO BE DELIVERED TO THE PUBLIC WORKS BUILDING.

TYPICAL HYDRANT LAYOUT
(VALVE IN BOULEVARD)

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 201 Victoria

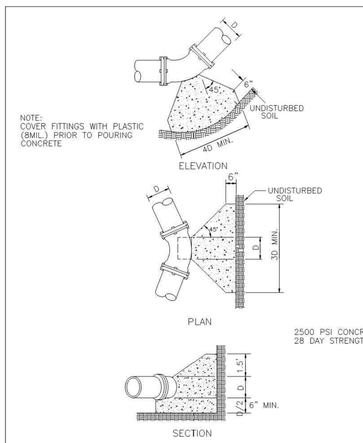


NOTES:
SUPPLY ONE EXTRA 4' GATE VALVE KEY OR ONE EXTRA CURB STOP STAND PIPE PER PROJECT, AS DIRECTED BY THE ENGINEER.
EXTRA KEYS AND EXTENSIONS SHALL BE DELIVERED TO THE PUBLIC WORKS BUILDING.

GATE VALVE INSTALLATION

FEBRUARY 2022

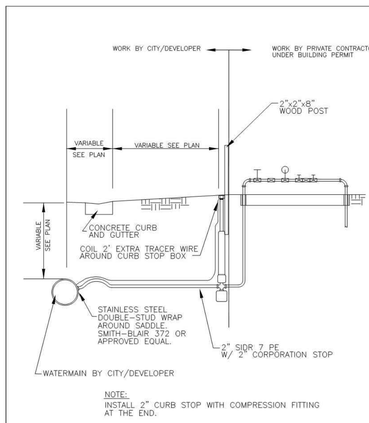
CITY OF VICTORIA | STANDARD DRAWING NO. 203 Victoria



CONCRETE REACTION BACKING
(FOR BENDS)

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 206 Victoria

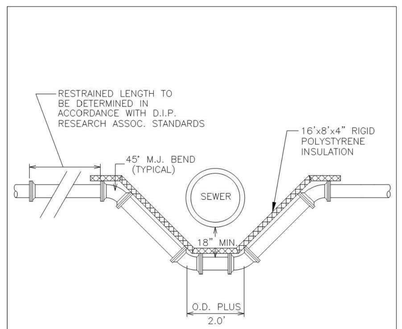


NOTE:
INSTALL 2" CURB STOP WITH COMPRESSION FITTING AT THE END.

IRRIGATION SERVICE

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 208 Victoria

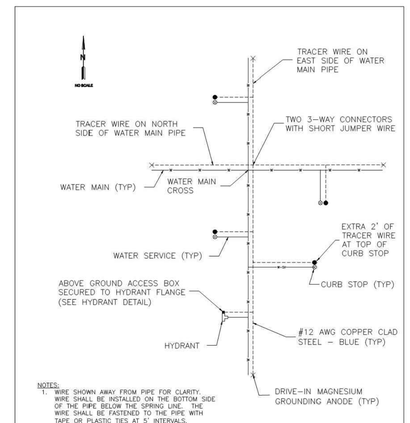


NOTE: FITTINGS SHALL BE RESTRAINED WITH THE USE OF APPROVED MECHANICAL JOINT RESTRAINING GLANDS.

WATERMAIN OFFSET

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 210 Victoria



NOTES:
1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY. WIRE SHALL BE INSTALLED ON THE BOTTOM SIDE OF THE PIPE BELOW THE SPRING LINE. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 5' INTERVALS.

TRACER WIRE PLAN (WATER)

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 211 Victoria

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

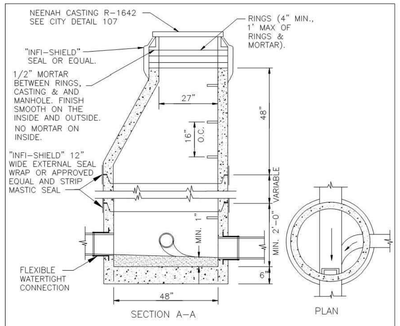
REVISION SUMMARY

DATE	DESCRIPTION

CIVIL DETAILS

C5.1

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

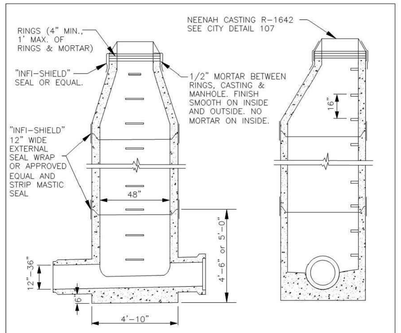


NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.
MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC, PER ASTM C478. STEP LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
PRECAST REINFORCED CONCRETE MANHOLE SECTIONS PER ASTM C478, FURNISHED WITH O-RING GASKETS AND LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER THE CONE WHENEVER POSSIBLE.
PIPE CONNECTIONS TO MANHOLE SHALL BE MADE WITH A FLEXIBLE WATER TIGHT CONNECTION AND CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.
COPPERHEAD LD14GTP-ADJ SNAKE PIT SHALL BE USED FOR OFF ROAD STRUCTURES.
ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

SANITARY SEWER MANHOLE, TYPE 301
(PIPES 27" OR LESS)

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 301 Victoria

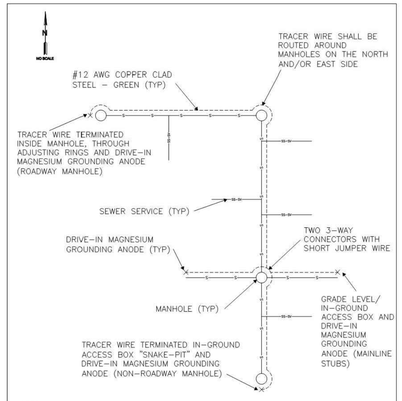


NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.
MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. STEP LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
PRECAST REINFORCED CONCRETE MANHOLE SECTIONS PER ASTM C478, FURNISHED WITH O-RING GASKETS AND LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER THE CONE WHENEVER POSSIBLE.
PIPE CONNECTIONS TO MANHOLE SHALL BE MADE WITH A FLEXIBLE WATER TIGHT CONNECTION AND CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.
ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

SANITARY SEWER MANHOLE, TYPE 305

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 305 Victoria

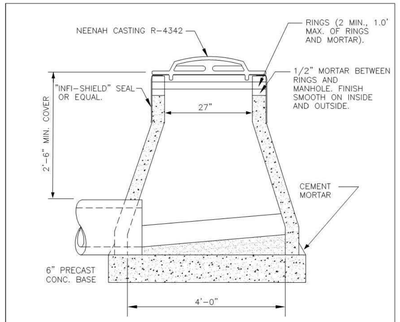


NOTES:
1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY. WIRE SHALL BE INSTALLED ON THE BOTTOM SIDE OF THE PIPE BELOW THE SPRING LINE. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 5' INTERVALS.

TRACER WIRE PLAN (SEWER)

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 315 Victoria

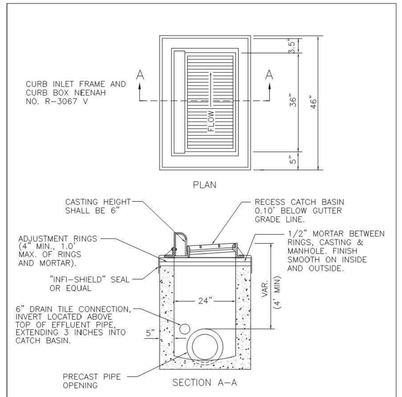


NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
CAST IRON CATCH BASIN FRAME & COVER CASTINGS PER SPECIFICATIONS.
PRECAST REINFORCED CONCRETE CONE SECTION & PRECAST BASE PER ASTM C478.
FILL OPENING BETWEEN PIPE AND MANHOLE WALL WITH CEMENT MORTAR INSIDE SURFACE SHALL BE FINISHED SMOOTH.
ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

CATCH BASIN, TYPE 402

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 402 Victoria

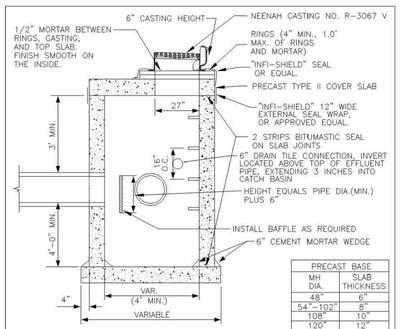


PRECAST REINFORCED CONCRETE CATCH BASIN & BASE SLAB PER ASTM C478
ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

CATCH BASIN, TYPE 404

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 404 Victoria



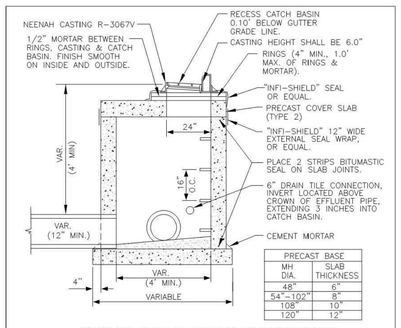
PRECAST BASE	
MH DIA.	SLAB THICKNESS
48"	6"
54"-102"	8"
108"	10"
120"	12"

NOTES: NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
CAST IRON FRAME & GRATE CASTINGS PER SPECIFICATIONS.
MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
PRECAST REINFORCED CONCRETE BASE SLAB & COVER SLAB PER ASTM C478.
PRECAST REINFORCED CONCRETE MANHOLE SECTIONS PER ASTM C478, FURNISHED WITH O-RING GASKETS & LUBRICANT, OR 8" CONCRETE MANHOLE BLOCK MANHOLE SECTION WITH 1/2" MORTARED EXTERIOR
FILL OPENING BETWEEN PIPE AND MANHOLE WALL WITH CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.
A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER TOP SLAB WHENEVER POSSIBLE
ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

CATCH BASIN/MANHOLE WITH SUMP, TYPE 405

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 405 Victoria



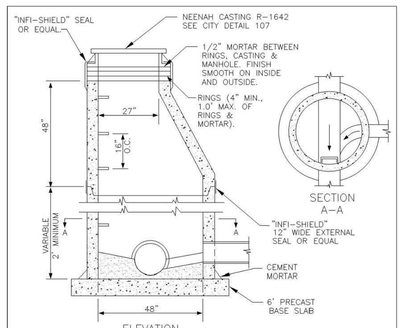
PRECAST BASE	
MH DIA.	SLAB THICKNESS
48"	6"
54"-102"	8"
108"	10"
120"	12"

NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
CAST IRON FRAME & GRATE CASTINGS PER SPECIFICATIONS.
MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
PRECAST REINFORCED CONCRETE BASE SLAB & COVER SLAB PER ASTM C478,
PRECAST REINFORCED CONCRETE MANHOLE SECTIONS PER ASTM C478, OR 8" CONCRETE MANHOLE BLOCK WITH 1/2" MORTARED EXTERIOR.
FURNISH PRECAST CONCRETE MANHOLE SECTIONS WITH O-RING GASKETS & LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
FILL OPENING BETWEEN PIPE AND MANHOLE WALL WITH CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.
A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER TOP SLAB WHENEVER POSSIBLE
ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

CATCH BASIN/MANHOLE, TYPE 406

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 406 Victoria



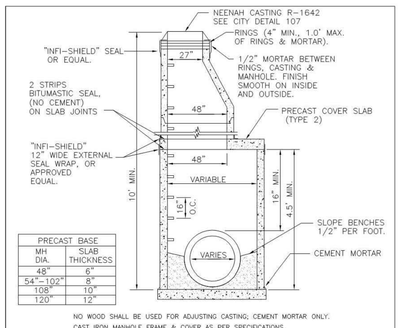
ELEVATION

NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.
MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
PRECAST REINFORCED CONCRETE MANHOLE SECTIONS & BASE SLAB PER ASTM C478.
FURNISH PRECAST MANHOLE SECTIONS WITH O-RING GASKETS & LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER THE CONE WHENEVER POSSIBLE.
FILL OPENING BETWEEN PIPE & MH WALL WITH CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.
ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

STORM SEWER MANHOLE, TYPE 407
(PIPES 27" OR LESS)

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 407 Victoria



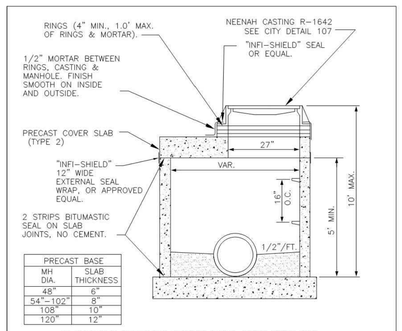
PRECAST BASE	
MH DIA.	SLAB THICKNESS
48"	6"
54"-102"	8"
108"	10"
120"	12"

NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.
MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
PRECAST REINFORCED CONCRETE MANHOLE SECTIONS & BASE SLAB PER ASTM C478.
FURNISH PRECAST MANHOLE SECTIONS WITH O-RING GASKETS & LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER THE CONE WHENEVER POSSIBLE.
FILL OPENING BETWEEN PIPE & MH WALL WITH CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.
ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

STORM SEWER MANHOLE, TYPE 408
(PIPES 30" & LARGER)

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 408 Victoria



PRECAST BASE	
MH DIA.	SLAB THICKNESS
48"	6"
54"-102"	8"
108"	10"
120"	12"

NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.
MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
PRECAST REINFORCED CONCRETE MANHOLE SECTIONS & BASE SLAB PER ASTM C478.
FURNISH PRECAST MANHOLE SECTIONS WITH O-RING GASKETS & LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
FILL OPENING BETWEEN PIPE & MH WALL WITH CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.
A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER TOP SLAB WHENEVER POSSIBLE
ANY UTILITY MORTAR SHALL MEET ASTM C270 AND C1714. SPEC MIX UNDERGROUND UTILITY MORTAR OR APPROVED EQUAL

STORM SEWER MANHOLE, TYPE 409

FEBRUARY 2022

CITY OF VICTORIA | STANDARD DRAWING NO. 409 Victoria

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386
UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

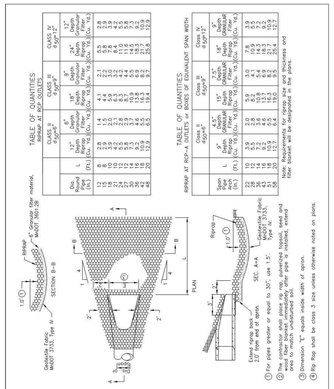
REVISION SUMMARY

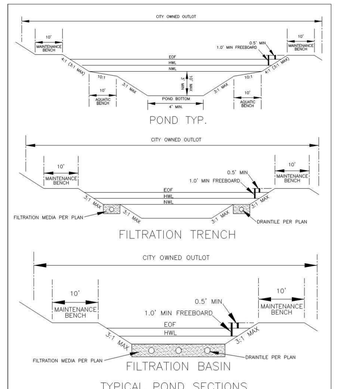
DATE	DESCRIPTION

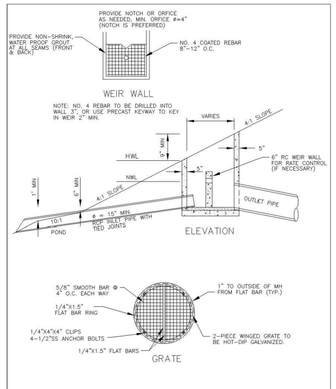
CIVIL DETAILS

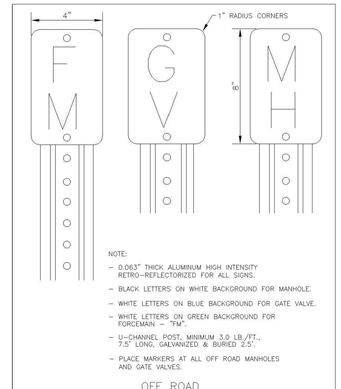
C5.2

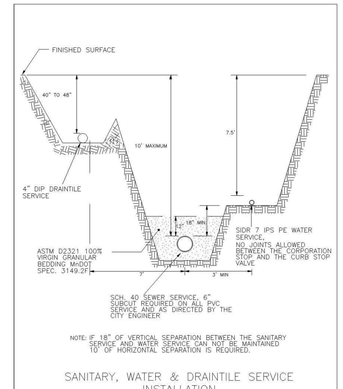
© COPYRIGHT 2023 CIVIL SITE GROUP INC.

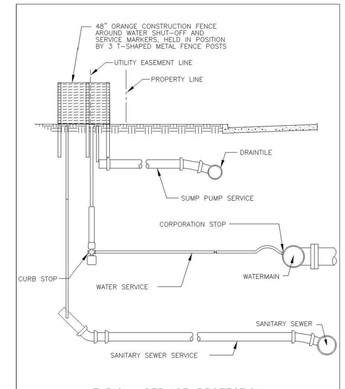


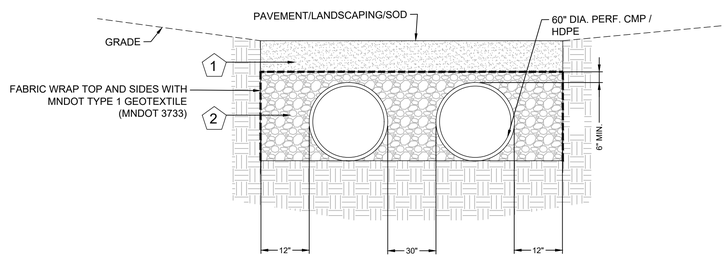












KEY
1. TOPSOIL
2. FREE DRAINING ANGULAR DOUBLE WASHED STONE 3/4" - 2" PARTICLE SIZE (NON-CONCRETE). COORDINATE MATERIAL / PARTICLE SIZE W/ MANUFACTURER. INSTALL TO MIN. 95% STANDARD DENSITY PER AASHTO T99.

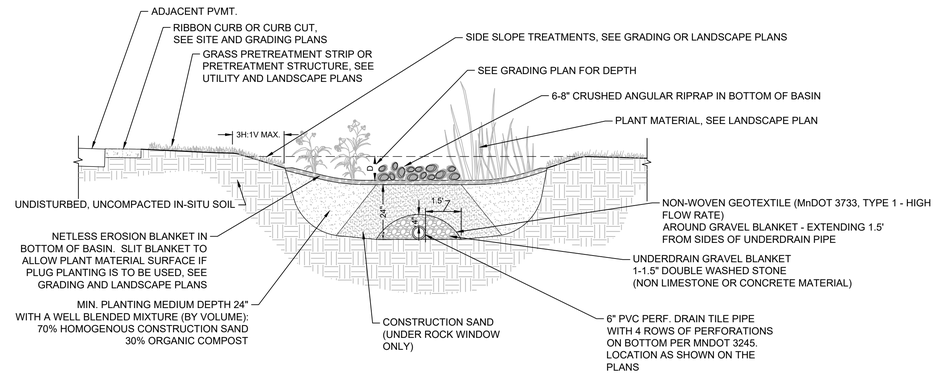
CONSTRUCTION SEQUENCING

1. INSTALL SILT FENCE AND/OR OTHER APPROPRIATE TEMPORARY EROSION CONTROL DEVICES TO PREVENT SEDIMENT FROM LEAVING OR ENTERING THE PRACTICE DURING CONSTRUCTION.
2. ALL DOWN-GRADIENT PERIMETER SEDIMENT CONTROL BMP'S MUST BE IN PLACE BEFORE ANY UP-GRADIENT LAND DISTURBING ACTIVITY BEGINS.
3. PERFORM CONTINUOUS INSPECTIONS OF EROSION CONTROL PRACTICES.
4. INSTALL UTILITIES (WATER, SANITARY SEWER, ELECTRIC, PHONE, FIBER OPTIC, ETC) PRIOR TO THE STORMWATER SYSTEM.
5. PERFORM ALL OTHER SITE IMPROVEMENTS.
6. SEED AND MULCH ALL AREAS AFTER DISTURBANCE.
7. CONSTRUCT RETENTION DEVICE UPON STABILIZATION OF CONTRIBUTING DRAINAGE AREA.
8. IMPLEMENT TEMPORARY AND PERMANENT EROSION CONTROL PRACTICES.
9. PLANT AND MULCH SITE.
10. REMOVE TEMPORARY EROSION CONTROL DEVICES AFTER THE CONTRIBUTING DRAINAGE AREA IS ADEQUATELY VEGETATED.

GENERAL NOTES
1. IN THE EVENT THAT SEDIMENT IS INTRODUCED INTO THE BMP DURING OR IMMEDIATELY FOLLOWING EXCAVATION, THIS MATERIAL SHALL BE REMOVED FROM THE PRACTICE PRIOR TO CONTINUING CONSTRUCTION.
2. GRADING OF RETENTION DEVICES SHALL BE ACCOMPLISHED USING LOW-COMPACTION EARTH-MOVING EQUIPMENT TO PREVENT COMPACTION OF UNDERLYING SOILS.
3. ALL SUB MATERIALS BELOW THE SPECIFIED RETENTION DEPTH (ELEVATION) SHALL BE UNDISTURBED, UNLESS OTHERWISE NOTED.
4. SEE UTILITY PLAN / SHOP DRAWINGS FOR SYSTEM LAYOUT.
5. TYPICAL DETAILS ARE FOR REFERENCE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH REVIEWED SHOP DRAWINGS.

1 UNDERGROUND RATE CONTROL SYSTEM

N T S



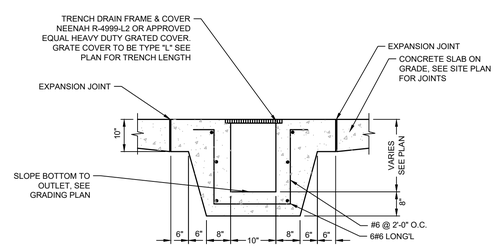
CONSTRUCTION SEQUENCING

1. INSTALL SILT FENCE AND/OR OTHER APPROPRIATE TEMPORARY EROSION CONTROL DEVICES TO PREVENT SEDIMENT FROM LEAVING OR ENTERING THE PRACTICE DURING CONSTRUCTION.
2. ALL DOWN-GRADIENT PERIMETER SEDIMENT CONTROL BMP'S MUST BE IN PLACE BEFORE ANY UP-GRADIENT LAND DISTURBING ACTIVITY BEGINS.
3. PERFORM CONTINUOUS INSPECTIONS OF EROSION CONTROL PRACTICES.
4. INSTALL UTILITIES (WATER, SANITARY SEWER, ELECTRIC, PHONE, FIBER OPTIC, ETC) PRIOR TO THE STORMWATER SYSTEM.
5. ROUGH GRADE THE SITE. IF BIORETENTION AREAS ARE BEING USED AS TEMPORARY SEDIMENT BASINS, LEAVE A MINIMUM OF 3 FEET OF COVER OVER THE PRACTICE TO PROTECT THE UNDERLYING SOILS FROM CLOGGING.
6. PERFORM ALL OTHER SITE IMPROVEMENTS.
7. PLANT ALL AREAS AFTER DISTURBANCE.
8. CONSTRUCT BIORETENTION DEVICE UPON STABILIZATION OF CONTRIBUTING DRAINAGE AREA.
9. IMPLEMENT TEMPORARY AND PERMANENT EROSION CONTROL PRACTICES.
10. PLANT AND/OR ROCK MULCH BIORETENTION DEVICE.
11. REMOVE TEMPORARY EROSION CONTROL DEVICES AFTER THE CONTRIBUTING DRAINAGE AREA IS ADEQUATELY VEGETATED.

GENERAL NOTES
1. IN THE EVENT THAT SEDIMENT IS INTRODUCED INTO THE BMP DURING OR IMMEDIATELY FOLLOWING EXCAVATION, THIS MATERIAL SHALL BE REMOVED FROM THE PRACTICE PRIOR TO CONTINUING CONSTRUCTION.
2. GRADING OF BIORETENTION DEVICES SHALL BE ACCOMPLISHED USING LOW-COMPACTION EARTH-MOVING EQUIPMENT TO PREVENT COMPACTION OF UNDERLYING SOILS.
3. ALL SUB MATERIALS BELOW THE SPECIFIED BIORETENTION DEPTH (ELEVATION) SHALL BE UNDISTURBED, UNLESS OTHERWISE NOTED.
4. SEE UTILITY PLAN / SHOP DRAWINGS FOR SYSTEM LAYOUT.

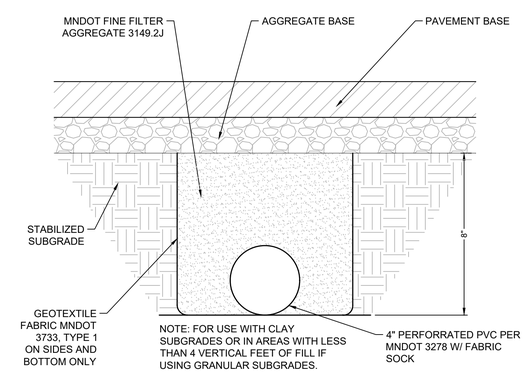
2 BIO-FILTRATION BASIN (RAIN GARDEN - TYP.)

N T S



3 TRENCH DRAIN

N T S



4 4" PVC DRAIN TILE DETAIL

N T S

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

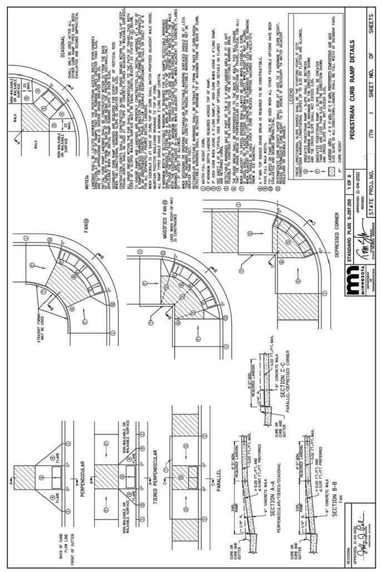
REVISION SUMMARY

DATE	DESCRIPTION

CIVIL DETAILS

C5.3

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

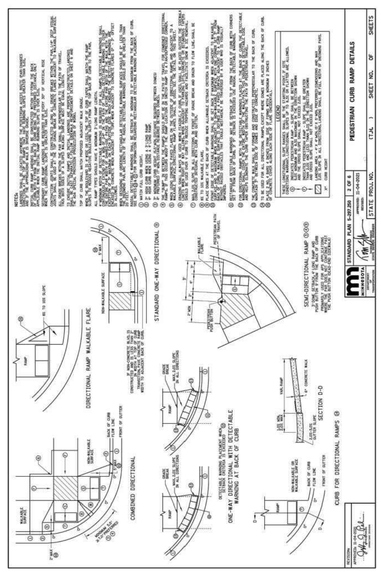


FEBRUARY 2022

MnDOT STANDARD PLAN 5-297.250 SHEET 1 OF 6

CITY OF VICTORIA

STANDARD DRAWING NO.
505A
Victoria

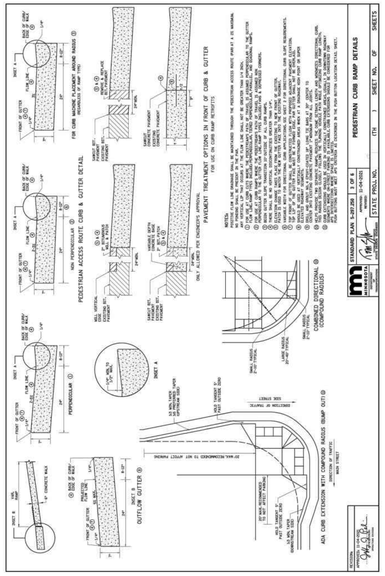


FEBRUARY 2022

MnDOT STANDARD PLAN 5-297.250 SHEET 2 OF 6

CITY OF VICTORIA

STANDARD DRAWING NO.
505B
Victoria

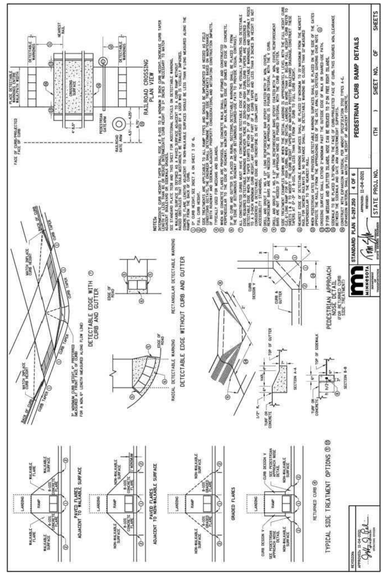


FEBRUARY 2022

MnDOT STANDARD PLAN 5-297.250 SHEET 3 OF 6

CITY OF VICTORIA

STANDARD DRAWING NO.
505C
Victoria

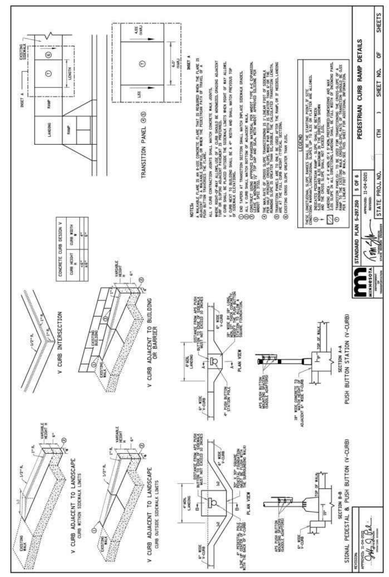


FEBRUARY 2022

MnDOT STANDARD PLAN 5-297.250 SHEET 4 OF 6

CITY OF VICTORIA

STANDARD DRAWING NO.
505D
Victoria

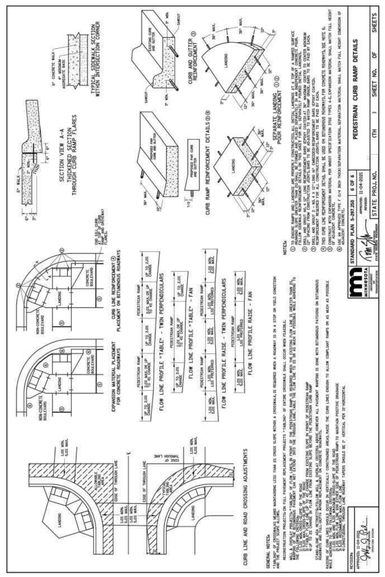


FEBRUARY 2022

MnDOT STANDARD PLAN 5-297.250 SHEET 5 OF 6

CITY OF VICTORIA

STANDARD DRAWING NO.
505E
Victoria

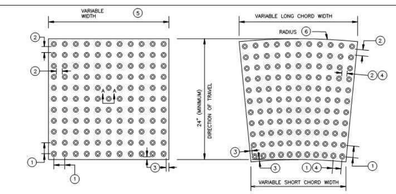


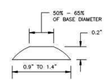
FEBRUARY 2022

MnDOT STANDARD PLAN 5-297.250 SHEET 6 OF 6

CITY OF VICTORIA

STANDARD DRAWING NO.
505F
Victoria





SECTION A–A
TRUNCATED DOME

TYPICAL RADIAL TRUNCATED DOME PLATES

RADIUS (FEET) ⑦	LONG CHORD WIDTH (INCHES)	SQ. FT. PER PLATE	PLATES REQUIRED FOR 90 DEGREE TURN
10	23–1/2	3.53	8
15	18–13/16	2.93	15
15	23–1/2	3.67	12
20	18–13/16	3.00	20
20	18–7/8	2.98	20
25	20–1/2	3.28	23
25	23–9/16	3.77	20
30	22–5/8	3.65	25
35	22	3.56	30

NOTES:

DETECTABLE WARNING SURFACES SHALL FOLLOW THE PUBLIC RIGHTS-OF-WAY ACCESSIBILITY GUIDELINES (PROWAG).

DETECTABLE WARNINGS CONSIST OF TRUNCATED DOMES ALIGNED IN A SQUARE OR RADIAL GRID PATTERN.

DETECTABLE WARNINGS ARE REQUIRED:
- –WHERE RAMPS, LANDINGS, OR BLENDED TRANSITIONS PROVIDE A FLUSH PEDESTRIAN CONNECTION TO THE ROADWAY.
- –WHERE PEDESTRIAN ACCESS ROUTES CROSS COMMERCIAL DRIVEWAYS.
- –AT MEDIANS OR PEDESTRIAN REFUGE AREAS, UNLESS OTHERWISE PERMITTED TO OPERATE LIKE A PUBLIC ROADWAY.
- –AT PEDESTRIAN RAILWAY CROSSINGS.
- –ON RAIL PLATFORMS WHERE BOARDING EDGES ARE NOT PROTECTED.

DETECTABLE WARNINGS SHALL EXTEND:
- –A MINIMUM OF 24" IN THE DIRECTION OF TRAVEL.
- –THE FULL WIDTH OF THE RAMP, LANDING, OR BLENDED TRANSITION, WITHIN 3" OF FULL WIDTH ON EITHER END.
- –THE FULL LENGTH OF THE PUBLIC USE AREA OF A RAIL PLATFORM.

DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT GUTTER, ROADWAY, OR WALKWAY, EITHER A LIGHT-ON-DARK OR DARK-ON-LIGHT. CONTRAST MAY BE PROVIDED ON THE FULL RAMP SURFACE, EXCLUDING THE FLARED SIDES.

TRUNCATED DOME PANELS SHALL BE FROM MNDOT'S APPROVED/QUALIFIED PRODUCT LISTS. PANELS SHALL BE CAST IRON AND NATURAL / RUSTY / UNFINISHED IN COLOR.

DETECTABLE WARNING SURFACE SHALL BE PAID FOR AS TRUNCATED DOMES BY THE SQUARE FOOT.

ALL TRUNCATED DOME SYSTEMS SHALL BE PLACED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER.

1. CENTER TO CENTER DOME SPACING: 1.6" MINIMUM, 2.4" MAXIMUM.
2. BASE TO BASE DOME SPACING: 0.65" MINIMUM.
3. DOME BASE TO PLATE EDGE SPACING: 0.25" MINIMUM, 0.75" MAXIMUM.
4. SPACING VARIES ON RADIAL PLATES.
5. TYPICAL WIDTHS AVAILABLE: 12", 18", 24", 30", 36". CHECK WITH MANUFACTURERS FOR AVAILABLE WIDTHS.
6. ON RADIAL PLATE, RADIUS DEFINED AT BACK OF CURB.
7. TYPICAL RADII. CHECK WITH MANUFACTURERS FOR AVAILABLE RADII.

DETECTABLE WARNING SURFACE–
TRUNCATED DOMES

FEBRUARY 2022

CITY OF VICTORIA

STANDARD DRAWING NO.
506
Victoria

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

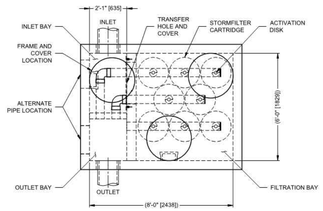
REVISION SUMMARY

DATE	DESCRIPTION

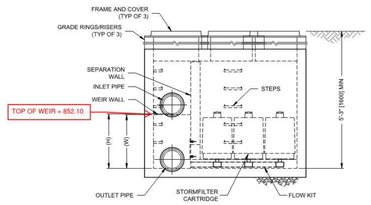
CIVIL DETAILS

C5.4

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



PLAN



ELEVATION

The Stormwater Management StormFilter®

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,652,636; 5,704,376; 5,787,537; 5,861,107; 6,027,639; 6,040,546; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

STORMFILTER DESIGN NOTES

- STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD
- 4.6' x 8' [1829 x 2438] PEAK DIVERSION STYLE STORMFILTER IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (8) AND IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR A RIGHT INLET CONFIGURATION
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS NOTED OTHERWISE

CARTRIDGE SIZE (in. [mm])	27 [686]		18 [457]		LOW DROP	
RECOMMENDED HYDRAULIC DROP (H) (ft. [mm])	3.05 [930]		2.3 [701]		1.8 [549]	
HEIGHT OF WEIR (W) (ft. [mm])	3.00 [914]		2.25 [686]		1.75 [533]	
SPECIFIC FLOW RATE (gpm/sf [L/s/m²])	2 [1.36]	1.67* [1.13]*	1 [0.68]	2 [1.36]	1.67* [1.13]*	1 [0.68]	2 [1.36]	1.67* [1.13]*	1 [0.68]
CARTRIDGE FLOW RATE (gpm [L/s])	22.5 [1.42]	18.79 [1.19]	11.25 [0.71]	15 [0.95]	12.53 [0.79]	7.5 [0.47]	10 [0.63]	8.35 [0.53]	5 [0.32]

* 1.67 gpm/sf [1.13 L/s/m²] SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY

18.79 GPM = 0.34 CFS

FRAME AND GRATE
(24" SQUARE)
(NOT TO SCALE)

FRAME AND COVER
(30" ROUND)
(NOT TO SCALE)

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (cfs [L/s])	0.34 cfs		
PEAK FLOW RATE (cfs [L/s])			
RETURN PERIOD OF PEAK FLOW (yrs)			
CARTRIDGE FLOW RATE			
CARTRIDGE SIZE (27, 18, LOW DROP (LD))			
MEDIA TYPE (PERLITE, ZPG, PSORB)			
NUMBER OF CARTRIDGES REQUIRED			
INLET BAY RIM ELEVATION			
FILTER BAY RIM ELEVATION			
PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
NOTES/SPECIAL REQUIREMENTS:			

PERFORMANCE SPECIFICATION
FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7" [178].** FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **38 SECONDS**. SPECIFIC FLOW RATE SHALL BE **2 GPM/SF [1.36 L/s/m²] (MAXIMUM).** SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF [13.35 L/s/m³] OF MEDIA (MAXIMUM).**

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. ALTERNATE DIMENSIONS ARE IN MILLIMETERS [mm] UNLESS NOTED OTHERWISE.
4. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
5. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
6. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 10' [3048] AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER OPENING COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

SFPD0608 (6' x 8')
PEAK DIVERSION STORMFILTER
STANDARD DETAIL

\\STORMWATER\COMMON\03 STORMFILTER\40 STANDARD DRAWINGS\SF PEAK DIV\SFD0606\SFD0608-DTL.DWG 3/16/2022 9:10 AM

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

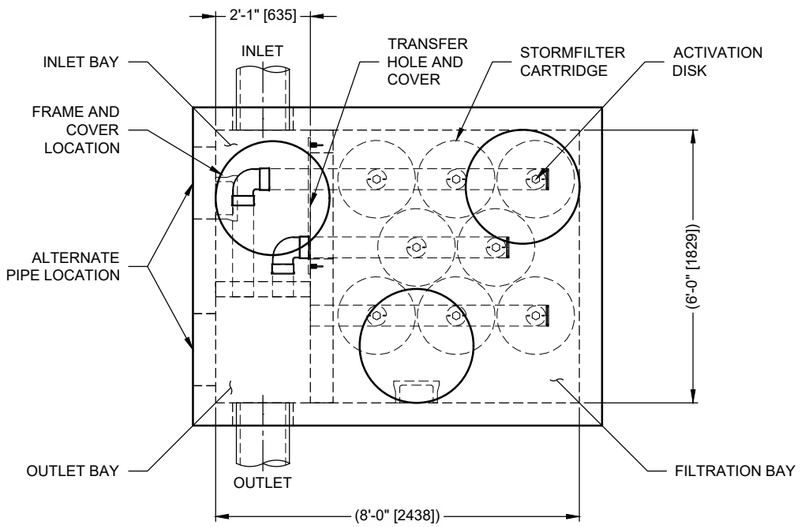
REVISION SUMMARY

DATE	DESCRIPTION

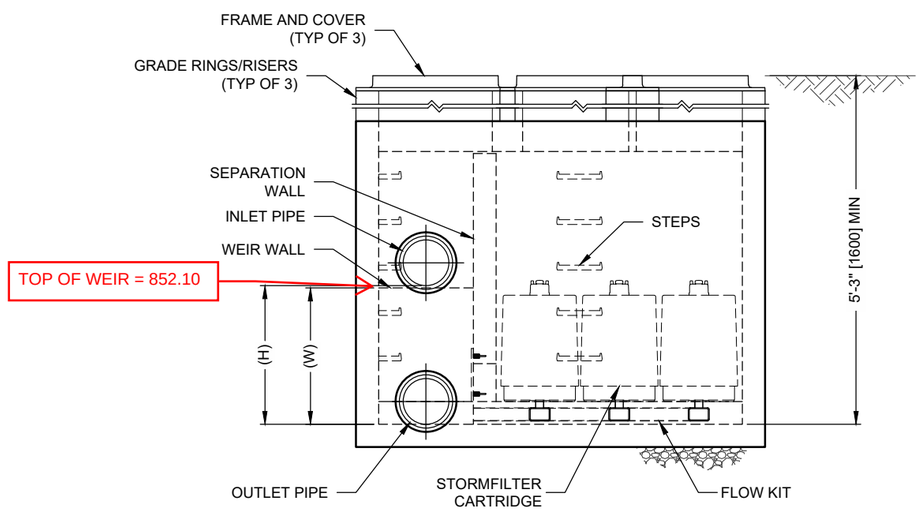
CIVIL DETAILS

C5.5

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



PLAN



ELEVATION

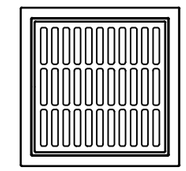
STORMFILTER DESIGN NOTES

- STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD
- A 6' x 8' [1829 x 2438] PEAK DIVERSION STYLE STORMFILTER IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (8) AND IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR A RIGHT INLET CONFIGURATION
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS NOTED OTHERWISE

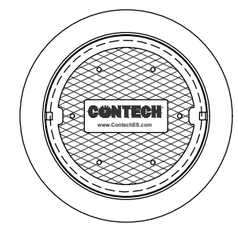
CARTRIDGE SIZE (in. [mm])	27 [686]			18 [457]			LOW DROP		
RECOMMENDED HYDRAULIC DROP (H) (ft. [mm])	3.05 [930]			2.3 [701]			1.8 [549]		
HEIGHT OF WEIR (W) (ft. [mm])	3.00 [914]			2.25 [686]			1.75 [533]		
SPECIFIC FLOW RATE (gpm/sf [L/s/m^2])	2 [1.36]	1.67* [1.13]*	1 [0.68]	2 [1.36]	1.67* [1.13]*	1 [0.68]	2 [1.36]	1.67* [1.13]*	1 [0.68]
CARTRIDGE FLOW RATE (gpm [L/s])	22.5 [1.42]	18.79 [1.19]	11.25 [0.71]	15 [0.95]	12.53 [0.79]	7.5 [0.47]	10 [0.63]	8.35 [0.53]	5 [0.32]

* 1.67 gpm/sf [1.13 L/s/m^2] SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY

18.79 GPM = 0.34 CFS



FRAME AND GRATE
(24" SQUARE)
(NOT TO SCALE)



FRAME AND COVER
(30" ROUND)
(NOT TO SCALE)

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (cfs [L/s])	0.34 cfs
PEAK FLOW RATE (cfs [L/s])	
RETURN PERIOD OF PEAK FLOW (yrs)	
CARTRIDGE FLOW RATE	
CARTRIDGE SIZE (27, 18, LOW DROP (LD))	
MEDIA TYPE (PERLITE, ZPG, PSORB)	
NUMBER OF CARTRIDGES REQUIRED	
INLET BAY RIM ELEVATION	
FILTER BAY RIM ELEVATION	

PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			

NOTES/SPECIAL REQUIREMENTS:

PERFORMANCE SPECIFICATION

FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7" [178].** FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **38 SECONDS**. SPECIFIC FLOW RATE SHALL BE **2 GPM/SF [1.36 L/s/m^2] (MAXIMUM)**. SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF [13.39 L/s/m^3] OF MEDIA (MAXIMUM).**

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. ALTERNATE DIMENSIONS ARE IN MILLIMETERS [mm] UNLESS NOTED OTHERWISE.
4. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
5. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
6. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 10' [3048] AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER OPENING COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

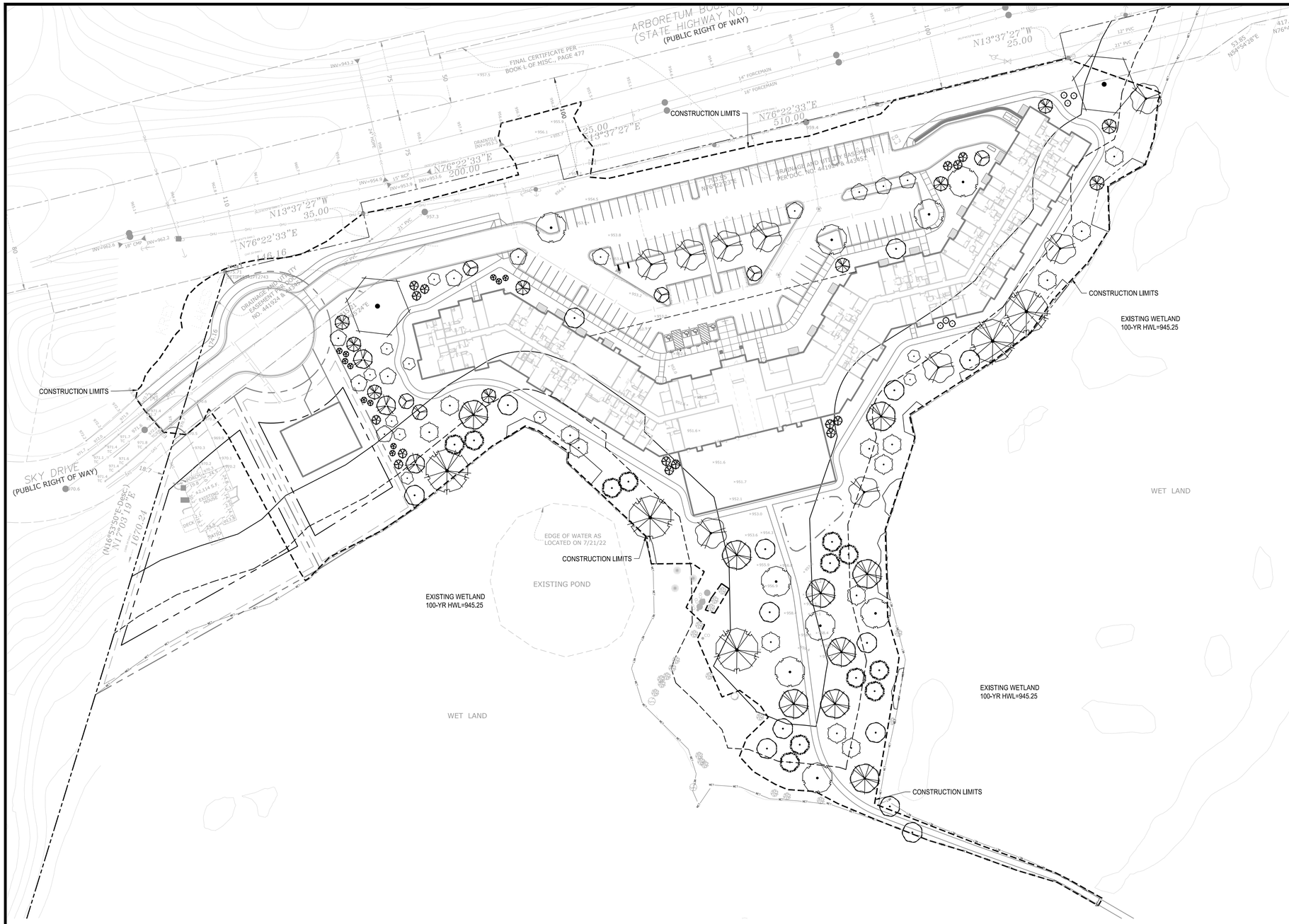
The Stormwater Management StormFilter®

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,322,629; 5,524,576; 5,707,527; 5,985,157; 6,027,639; 6,649,048; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

SFPD0608 (6' x 8')
PEAK DIVERSION STORMFILTER
STANDARD DETAIL

I:\STORMWATER\COMMOPS\10 STORMFILTER\40 STANDARD DRAWINGS\SF PEAK DIVERSION\DWG\SFPD0608-DTL.DWG 3/16/2022 8:10 AM



POLLINATOR SAFE PLANT MATERIAL:

1. THE CONTRACTOR SHALL PROVIDE ONLY PLANT MATERIAL FREE OF NEONICOTINOID BASED INSECTICIDES AND/OR TREATMENTS OF ANY KIND, INCLUDING BY NOT LIMITED TO IMIDACLOPRID (CONFIDOR, ADMIRE, GAUCHO, ADVOCATE), THIAMETHOXAM (ACTARA, PLATINUM, CRUISER), CLOTHIANIDIN (PONCHO, DANTOSU, DANTOP), ACETAMIPRID (MOSPILAN, ASSAIL, CHIPCOTRISTAR), THIACLOPRID (CALYPSO), DINOTEFURAN (STARKLE, SAFARI, VENOM), AND NITENPYRAM (CAPSTAR, GUARDIAN).
2. CONTRACTOR SHALL CERTIFY, THROUGH SUPPLIERS POLICY STATEMENT OR AFFIDAVIT, THAT NO NEONICOTINOID BASED INSECTICIDES HAVE BEEN USED ON SITE OR DIRECTLY ADJACENT TO THE GROWING OR STORAGE PLOTS OF THE SUPPLIED PLANT MATERIAL, INCLUDING THE PLANTING OF AGRICULTURAL (OR OTHER) SEED TREATED WITH NEONICS..

PLANTING SEASON SCHEDULE

SEASON	CONIFEROUS	DECIDUOUS	REMARKS
SPRING PLANTING	APRIL 15 - JUNE 15	APRIL 15 - JUNE 15	
FALL PLANTING	AUGUST 21 - SEPTEMBER 30	AUGUST 15 - NOVEMBER 15	
NOTE: ADJUSTMENTS TO PLANTING DATES MUST BE APPROVED IN WRITING BY THE LANDSCAPE ARCHITECT.			

LEGEND

EDGING - SHALL BE COMMERCIAL GRADE, 4" DEPTH ALUMINUM, BLACK OR DARK GREEN IN COLOR, INCLUDE ALL CONNECTORS, STAKES, & ALL APPURTENANCES PER MANUF. INSTALL PER MANUF. INSTRUC./SPECS.

DECORATIVE BOULDERS (ROUNDED & BLOCK STYLE), 18"-30" DIA.

CONSTRUCTION LIMITS

SEE SHEET C0.1 FOR GENERAL LANDSCAPE NOTES

SEE SHEET L1.4 FOR PLANTING SCHEDULE

Know what's below. Call before you dig.

1" = 50'-0"
25'-0" 0 50'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.

Patrick J. Sarver
DATE_____ LICENSE NO. 24904

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

LANDSCAPE PLAN OVERALL

L1.0

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.

Patrick J. Sarver

DATE _____ LICENSE NO. 24904

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

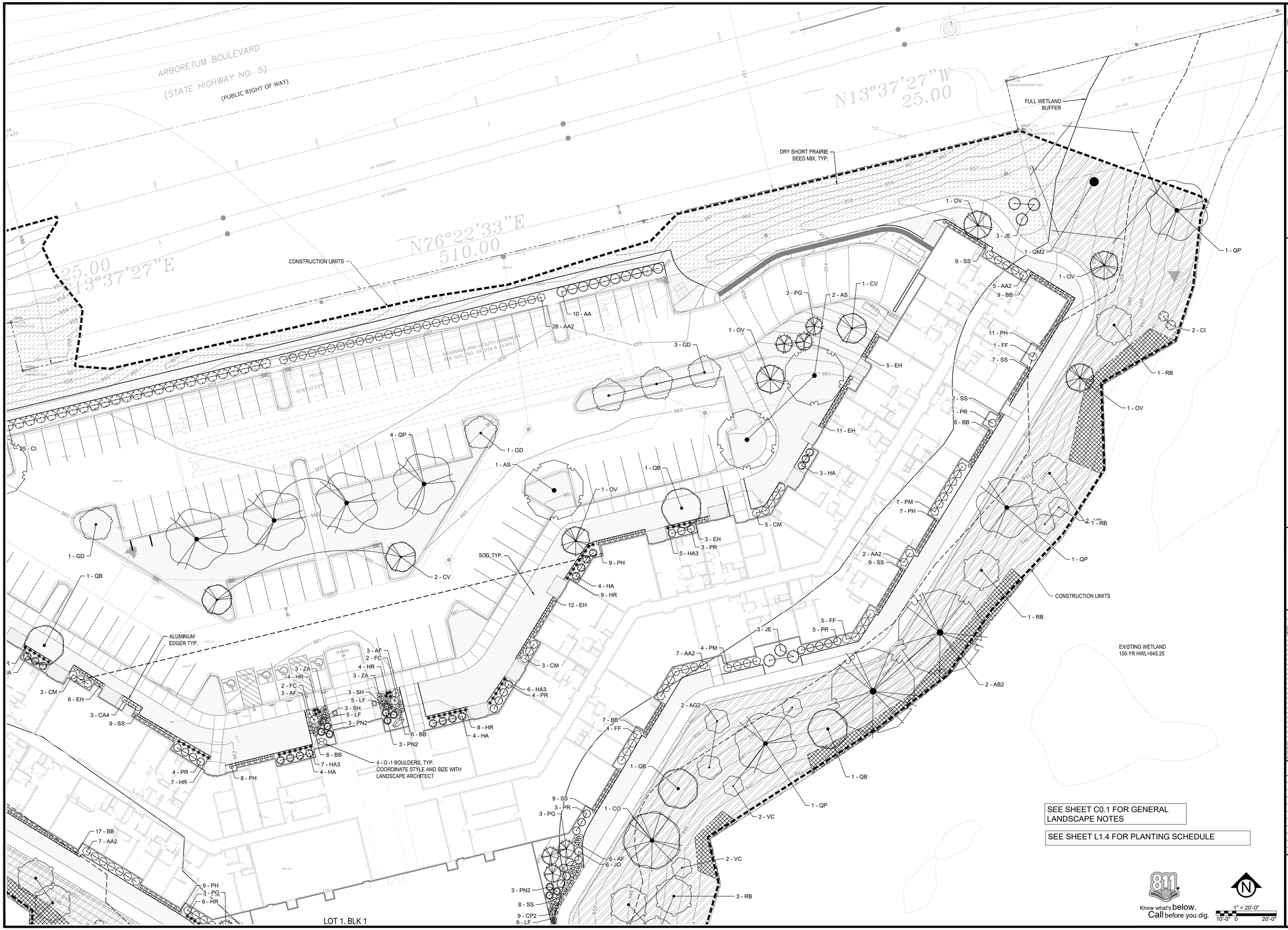
REVISION SUMMARY

DATE	DESCRIPTION

LANDSCAPE PLAN WEST

L1.1

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.

Patrick J. Sarver

DATE _____ LICENSE NO. 24904

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

LANDSCAPE PLAN NORTHEAST

L1.2

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

SEE SHEET C0.1 FOR GENERAL LANDSCAPE NOTES

SEE SHEET L1.4 FOR PLANTING SCHEDULE

Know what's below. Call before you dig.

1" = 20'-0"
10'-0" 0 20'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.

Patrick J. Sarver
DATE _____ LICENSE NO. 24904

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

LANDSCAPE PLAN SOUTHEAST

L1.3

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

MULTI-FAMILY TREE SCHEDULE

TREES	QTY	COMMON / BOTANICAL NAME	CONT	NATIVE PLANTS	POLLINATOR
AB2	5	Black Maple / Acer nigrum	3" CAL. B&B	NATIVE	N
AS	9	Sugar Maple / Acer saccharum	3" CAL. B&B	NATIVE	Y
RB	14	River Birch / Betula nigra	3" CAL. B&B	NATIVE	N
CO	9	Shagbark Hickory / Carya ovata	3" CAL. B&B	NATIVE	N
GD	8	Street Keeper Honey Locust / Gleditsia triacanthos `Draves` TM	3" CAL. B&B	NATIVE CULTIVAR	N
QB	11	Swamp White Oak / Quercus bicolor	3" CAL. B&B	NATIVE	Y
QP	9	American Dream® Oak / Quercus bicolor 'JFS-KW12'	3" CAL. B&B	NATIVE CULTIVAR	N
QM2	2	Burr Oak / Quercus macrocarpa	3" CAL. B&B	NATIVE	
EVERGREEN TREES	QTY	COMMON / BOTANICAL NAME	CONT	NATIVE PLANTS	POLLINATOR
AR	3	Conical White Fir / Abies concolor `Conica`	#7 CONT	NOT NATIVE	
JE	6	Eastern Red Cedar / Juniperus virginiana	7` B&B	NATIVE	
PK2	12	Eastern Larch / Larix laricina	7` B&B	NATIVE	
PG	12	White Spruce / Picea glauca	7` B&B	NATIVE	
ORNAMENTAL TREES	QTY	COMMON / BOTANICAL NAME	CONT	NATIVE PLANTS	POLLINATOR
AG2	6	Autumn Brilliance Serviceberry / Amelanchier x grandiflora `Autumn Brilliance`	#20 CLUMP	NATIVE	Y
CV	6	Thornless Cockspur Hawthorn / Crataegus crus-galli inermis TM	1.5" Cal. B&B	NATIVE	Y
OV	7	American Hophornbeam / Ostrya virginiana	1.75" Cal B&B	NATIVE	Y

BUFFER TREE SCHEDULE

TREES	QTY	COMMON / BOTANICAL NAME	CONT	NATIVE PLANTS	POLLINATOR
GD	3	Street Keeper Honey Locust / Gleditsia triacanthos `Draves` TM	3" CAL. B&B	NATIVE CULTIVAR	N
PN	3	Clump Form Quaking Aspen / Populus tremuloides `Clump Form`	8` CLUMP	NATIVE CULTIVAR	N
QB	1	Swamp White Oak / Quercus bicolor	3" CAL. B&B	NATIVE	Y
EVERGREEN TREES	QTY	COMMON / BOTANICAL NAME	CONT	NATIVE PLANTS	POLLINATOR
AR	8	Conical White Fir / Abies concolor `Conica`	#7 CONT	NOT NATIVE	
PG	3	White Spruce / Picea glauca	7` B&B	NATIVE	
ORNAMENTAL TREES	QTY	COMMON / BOTANICAL NAME	CONT	NATIVE PLANTS	POLLINATOR
AG2	4	Autumn Brilliance Serviceberry / Amelanchier x grandiflora `Autumn Brilliance`	#20 CLUMP	NATIVE	Y
OV	3	American Hophornbeam / Ostrya virginiana	1.75" Cal B&B	NATIVE	Y

Groundcover Schedule

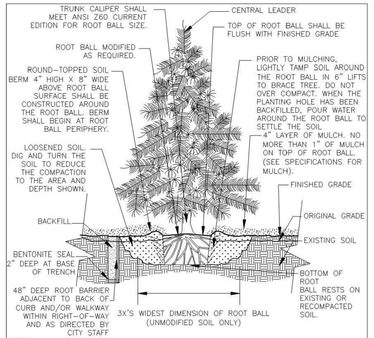
GROUND COVERS	COMMON / BOTANICAL NAME	SIZE
	DRY SHORT PRARIE MIX, SHOOTING STAR EQ. / DRY SHORT PRARIE MIX DRY SHORT NATIVE SEED MIX - SHOOTING STAR NATIVE SEED OR EQUIV., SEEDING RATE: 10 #/ACRE (64.4 SEEDS/SF)	Seed Mix
	Rock Maintanence Strip / Rock Maintanence Strip 1"-3" Dresser Trap Rock, uniform in size over filter fabric. Include aluminum edging as shown on plan, or as needed. Provide Samples. See detail.	Mulch
	Blue Grass Based / Sod Commercial grade, locally grown, well rooted sod blend of improved Kentucky Bluegrass w/ uniform color, leaf texture, density and varieties consisting of a minimum of two and no more than four common cultivars.	Sod
	MN SEED MIX #35-241 MESIC PRAIRIE / WETLAND BUFFER SEED MIX MN SEED MIX #35-241 MESIC PRAIRIE SEED MIX, PER MNDOT SEEDING MANUAL SPECIFICATIONS (2014) SEEDING RATE: 14.5 LB/ACRE (128.4 SEEDS/SF)	Seed Mix

Sedge Plug Schedule

CAREX PLUG MIX	4,801 sf		
Mix of sedge plugs for wetland buffer.			
Carex bebbii / Bebb's Oval Sedge	200	4" POT, NATIVE, N	
Carex brevior / Plains Oval Sedge	200	4" POT, NATIVE, N	
Carex intumescens / Shining Bur Sedge	200	4" POT, NATIVE, N	
Carex stricta / Common Tussock Sedge	649	4" POT, NATIVE, N	

Total Site Perennial and Shrub Schedule

SHRUBS	QTY	COMMON / BOTANICAL NAME	SIZE	NATIVE PLANTS	POLLINATOR FRIENDLY
AA2	27	Autumn Magic Black Chokeberry / Aronia melanocarpa `Autumn Magic`	#5 CONT	NATIVE	Y
CA4	3	New Jersey Tea / Ceanothus americanus	#1 CONT	NATIVE	Y
CM	16	Muskingham Gray Dogwood / Cornus racemosa `Muskingham`	#2 CONT	NATIVE CULTIVAR	Y
CI	34	Isanti Redosier Dogwood / Cornus sericea `Isanti`	#5 CONT	NATIVE CULTIVAR	Y
FC	4	Gold Tide Forsythia / Forsythia x `Courtasol` TM	#2 CONT	NOT NATIVE	Y
FF	24	Gold Cluster Forsythia / Forsythia x intermedia `Courtaneur` TM	#2 CONT	NOT NATIVE	Y
HA	18	Annabelle Hydrangea / Hydrangea arborescens `Annabelle`	#5 CONT	NOT NATIVE	Y
JO	11	Grey Owl Juniper / Juniperus virginiana `Grey Owl`	#5 CONT	NATIVE	N
PR	36	Raspberry Lemonade Ninebark / Physocarpus opulifolius 'ZLEYel2' TM	#5 CONT	NATIVE CULTIVAR	Y
PN2	12	Bird`s Nest Spruce / Picea abies `Nidiformis`	#5 CONT	NOT NATIVE	N
PM	21	Jade Parade Sand Cherry / Prunus pumila 'UNCONNPP002' TM	#5 CONT	NATIVE CULTIVAR	Y
VC	24	High Bush Cranberry / Viburnum trilobum	#5 CONT	NATIVE	Y
GRASSES	QTY	COMMON / BOTANICAL NAME	SIZE	NATIVE PLANTS	POLLINATOR FRIENDLY
AB3	26	Blackhawks Big Bluestem / Andropogon gerardii 'Blackhawks'	#1 CONT	NATIVE CULTIVAR	Y
BB	67	Blonde Ambition Blue Grama / Bouteloua gracilis `Blonde Ambition`	#1 CONT	NATIVE CULTIVAR	Y
EH	36	Bottlebrush Grass / Elymus hystrix	#1 CONT	NATIVE	Y
PH	79	Heavy Metal Switch Grass / Panicum virgatum `Heavy Metal`	#1 CONT	NATIVE CULTIVAR	Y
SS	71	Smoke Signal Little Bluestem / Schizachyrium scoparium `Smoke Signal`	#1 CONT	NATIVE CULTIVAR	Y
SH	12	Prairie Dropseed / Sporobolus heterolepis	#1 CONT	NATIVE	Y
PERENNIALS	QTY	COMMON / BOTANICAL NAME	SIZE	NATIVE PLANTS	POLLINATOR FRIENDLY
AF	17	Blue Fortune Anise Hyssop / Agastache x `Blue Fortune`	#1 CONT	NATIVE CULTIVAR	Y
AS2	3	Sun King Aralia / Aralia cordata `Sun King`	#2 CONT	NOT NATIVE	Y
CP2	13	Stiff Tickseed / Coreopsis palmata	4" POT	NATIVE	Y
HA3	18	Daylily / Hemerocallis x `Chicago Apache`	#1 CONT	NOT NATIVE	Y
HR	44	Daylily / Hemerocallis x `Rosy Returns`	#1 CONT	NOT NATIVE	Y
LF	19	Floristan White Blazing Star / Liatris spicata 'Floristan White'	#1 CONT	NATIVE CULTIVAR	Y
ZA	21	Golden Alexander / Zizia aurea	#1 CONT	NATIVE	Y



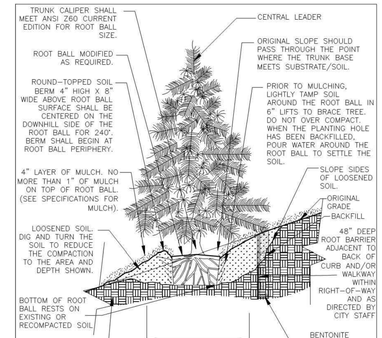
NOTES:
1. MODIFIED SOIL – DEPTH OF SOIL VARIES (SEE SPECIFICATIONS FOR SOIL MODIFICATION).
2. TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.
3. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.

POORLY DRAINED SOIL NOTES:
1. ROOT BALL SURFACE SHALL BE POSITIONED TO BE ONE – QUARTER ABOVE FINISHED GRADE.
2. EXISTING SITE SOIL SHALL BE ADDED TO CREATE A SMOOTH TRANSITION FROM THE TOP OF THE RAISED ROOT BALL TO THE FINISHED GRADE AT A 15% MAX. SLOPE.

CONIFEROUS TREE – MODIFIED/UNMODIFIED SOIL & POORLY DRAINED SOIL

FEBRUARY 2022 — URBAN TREE FOUNDATION © 2014 OPEN SOURCE FREE TO USE

CITY OF VICTORIA — STANDARD DRAWING NO. 901A Victoria

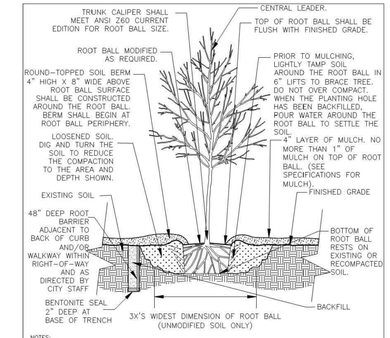


NOTES:
1. MODIFIED SOIL – DEPTH OF SOIL VARIES (SEE SPECIFICATIONS FOR SOIL MODIFICATION).
2. TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.
3. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.

CONIFEROUS TREE ON SLOPE 5% TO 50%: MODIFIED AND UNMODIFIED SOIL

FEBRUARY 2022 — URBAN TREE FOUNDATION © 2014 OPEN SOURCE FREE TO USE

CITY OF VICTORIA — STANDARD DRAWING NO. 901B Victoria



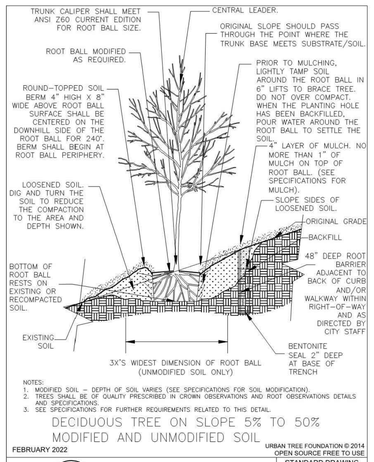
NOTES:
1. MODIFIED SOIL – DEPTH OF SOIL VARIES (SEE SPECIFICATIONS FOR SOIL MODIFICATION).
2. TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.
3. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.

POORLY DRAINED SOIL NOTES:
1. ROOT BALL SURFACE SHALL BE POSITIONED TO BE ONE – QUARTER ABOVE FINISHED GRADE.
2. EXISTING SITE SOIL SHALL BE ADDED TO CREATE A SMOOTH TRANSITION FROM THE TOP OF THE RAISED ROOT BALL TO THE FINISHED GRADE AT A 15% MAX. SLOPE.

DECIDUOUS TREE – MODIFIED/UNMODIFIED SOIL & POORLY DRAINED SOIL

FEBRUARY 2022 — URBAN TREE FOUNDATION © 2014 OPEN SOURCE FREE TO USE

CITY OF VICTORIA — STANDARD DRAWING NO. 902A Victoria

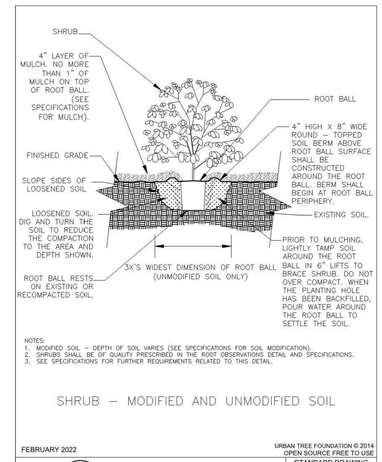


NOTES:
1. MODIFIED SOIL – DEPTH OF SOIL VARIES (SEE SPECIFICATIONS FOR SOIL MODIFICATION).
2. TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.
3. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.

DECIDUOUS TREE ON SLOPE 5% TO 50% MODIFIED AND UNMODIFIED SOIL

FEBRUARY 2022 — URBAN TREE FOUNDATION © 2014 OPEN SOURCE FREE TO USE

CITY OF VICTORIA — STANDARD DRAWING NO. 902B Victoria

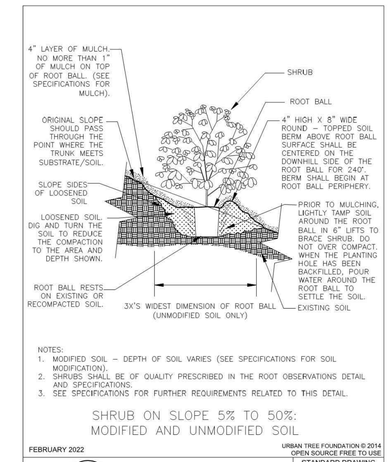


NOTES:
1. MODIFIED SOIL – DEPTH OF SOIL VARIES (SEE SPECIFICATIONS FOR SOIL MODIFICATION).
2. SHRUBS SHALL BE OF QUALITY PRESCRIBED IN THE ROOT OBSERVATIONS DETAIL AND SPECIFICATIONS.
3. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.

SHRUB – MODIFIED AND UNMODIFIED SOIL

FEBRUARY 2022 — URBAN TREE FOUNDATION © 2014 OPEN SOURCE FREE TO USE

CITY OF VICTORIA — STANDARD DRAWING NO. 903A Victoria



NOTES:
1. MODIFIED SOIL – DEPTH OF SOIL VARIES (SEE SPECIFICATIONS FOR SOIL MODIFICATION).
2. SHRUBS SHALL BE OF QUALITY PRESCRIBED IN THE ROOT OBSERVATIONS DETAIL AND SPECIFICATIONS.
3. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.

SHRUB ON SLOPE 5% TO 50%: MODIFIED AND UNMODIFIED SOIL

FEBRUARY 2022 — URBAN TREE FOUNDATION © 2014 OPEN SOURCE FREE TO USE

CITY OF VICTORIA — STANDARD DRAWING NO. 903B Victoria

PLANT SCHEDULE BUFFER PLANTINGS

SHRUBS	QTY	COMMON / BOTANICAL NAME	SIZE	NATIVE PLANTS	POLLINATOR FRIENDLY
CI	34	Isanti Redosier Dogwood / Cornus sericea `Isanti`	#5 CONT	NATIVE CULTIVAR	Y
VC	24	High Bush Cranberry / Viburnum trilobum	#5 CONT	NATIVE	Y

PLANT SCHEDULE BUFFER TREES

TREES	QTY	COMMON / BOTANICAL NAME	CONT	NATIVE PLANTS	POLLINATOR FRIENDLY
AB2	5	Black Maple / Acer nigrum	3" CAL. B&B	NATIVE	N
AS	5	Sugar Maple / Acer saccharum	3" CAL. B&B	NATIVE	Y
RB	14	River Birch / Betula nigra	3" CAL. B&B	NATIVE	N
CO	9	Shagbark Hickory / Carya ovata	3" CAL. B&B	NATIVE	N
QB	11	Swamp White Oak / Quercus bicolor	3" CAL. B&B	NATIVE	Y
QP	5	American Dream® Oak / Quercus bicolor 'JFS-KW12'	3" CAL. B&B	NATIVE CULTIVAR	N
QM2	1	Burr Oak / Quercus macrocarpa	3" CAL. B&B	NATIVE	
EVERGREEN TREES	QTY	COMMON / BOTANICAL NAME	CONT	NATIVE PLANTS	POLLINATOR FRIENDLY
PK2	12	Eastern Larch / Larix laricina	7` B&B	NATIVE	
ORNAMENTAL TREES	QTY	COMMON / BOTANICAL NAME	CONT	NATIVE PLANTS	POLLINATOR FRIENDLY
AG2	3	Autumn Brilliance Serviceberry / Amelanchier x grandiflora `Autumn Brilliance`	#20 CLUMP	NATIVE	Y
CV	1	Thornless Cockspur Hawthorn / Crataegus crus-galli inermis TM	1.5" Cal. B&B	NATIVE	Y
OV	3	American Hophornbeam / Ostrya virginiana	1.75" Cal B&B	NATIVE	Y

BUFFER LANDSCAPE REQUIREMENTS:					
25 FOOT BUFFER REQUIREMENTS					
PLANTS REQUIRED PER 50 LF:					
2 OVERSTORY TREES					
3 EVERGREEN TREES					
2 ORNAMENTAL TREES					
CALCULATIONS:					
X	LF	/	50	XX	LF
25' BUFFER - CALCULATIONS					
186	LF	/	50	3.72	
					PROVIDED
REQUIRED OVERSTORY:	3.72	*	2	7	7
REQUIRED EVERGREEN:	3.72	*	3	11	11
REQUIRED ORNAMENTAL:	3.72	*	2	7	7

LOT & MULTI-FAMILY LANDSCAPE REQUIREMENTS:					
REQUIRED TREES					
3 TREES REQUIRED PER DWELLING UNIT					
CALCULATIONS:					
X	UNITS	*	3	=	XX
LOT CALCULATIONS					
1	UNITS	*	3	=	3
REQUIRED TREES:	3				
MULTI-FAMILY CALCULATIONS*					
7.01	AC	*	25% Open Space	=	1.7525
1 tree/1,000 SF**	76.34				
1 shrub/1,000 SF**	76.34				
REQUIRED TREES:	77.00				
REQUIRED SHRUBS:	77.00				

TOTAL LOT & MULTI-FAMILY REQUIRED	
REQUIRED TREES:	80.00
REQUIRED SHRUBS:	77.00

*THIS BUILDING FALLS UNDER CBD ZONING, WHICH REQUIRES NO DEDICATED OPEN SPACE. HOWEVER, IT IS UNDER MY ASSUMPTION THAT LANDSCAPING TO A R-4 REQUIREMENT SHOULD BE SUFFICIENT

**THE SQUARE FOOTAGE USED TO CALCULATE THE REQUIRED OPEN SPACE WAS THE BUILDABLE SPACE FOR THE MULTI-FAMILY BUILDING, INCLUDING THE WETLAND BUFFER. HOWEVER I EXCLUDED THE WETLAND AND COUNTED THE SINGLE FAMILY LOT AS ITS OWN ENTITY.

SEE SHEET L1.0 FOR GENERAL LANDSCAPE NOTES & LEGEND

Know what's below. Call before you dig.

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.

Patrick J. Sarver
DATE_____ LICENSE NO. 24904

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

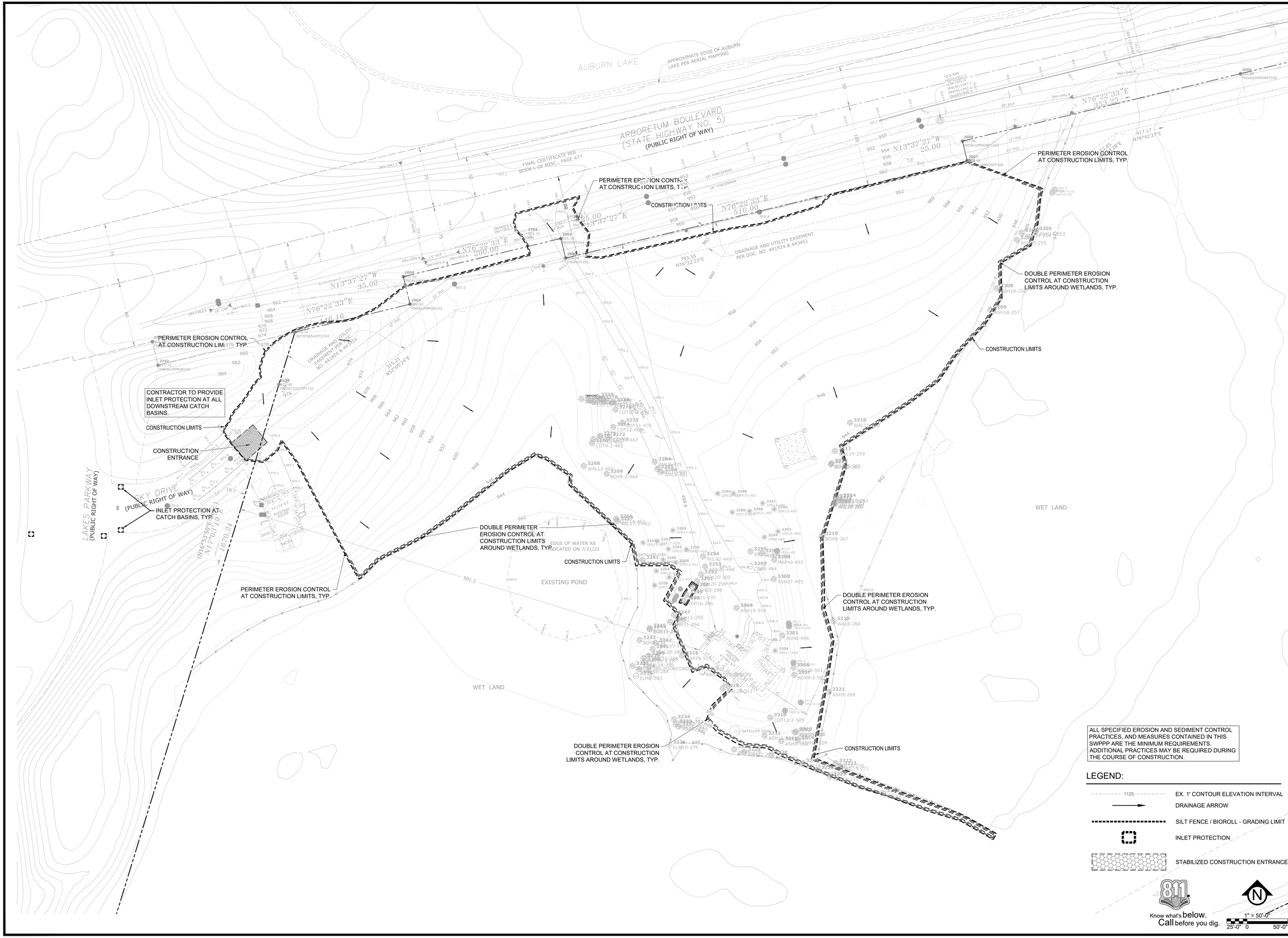
REVISION SUMMARY

DATE	DESCRIPTION

LANDSCAPE PLAN NOTES & DETAILS

L1.4

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



ALL SPECIFIED EROSION AND SEDIMENT CONTROL PRACTICES, AND MEASURES CONTAINED IN THIS SWPPP ARE THE MINIMUM REQUIREMENTS. ADDITIONAL PRACTICES MAY BE REQUIRED DURING THE COURSE OF CONSTRUCTION.

LEGEND:

- 1125 — EX. 1' CONTOUR ELEVATION INTERVAL
- DRAINAGE ARROW
- SILT FENCE / BIOROLL - GRADING LIMIT
- INLET PROTECTION
- STABILIZED CONSTRUCTION ENTRANCE

Know what's below. Call before you dig.

1" = 50'-0"
25'-0" 0 50'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

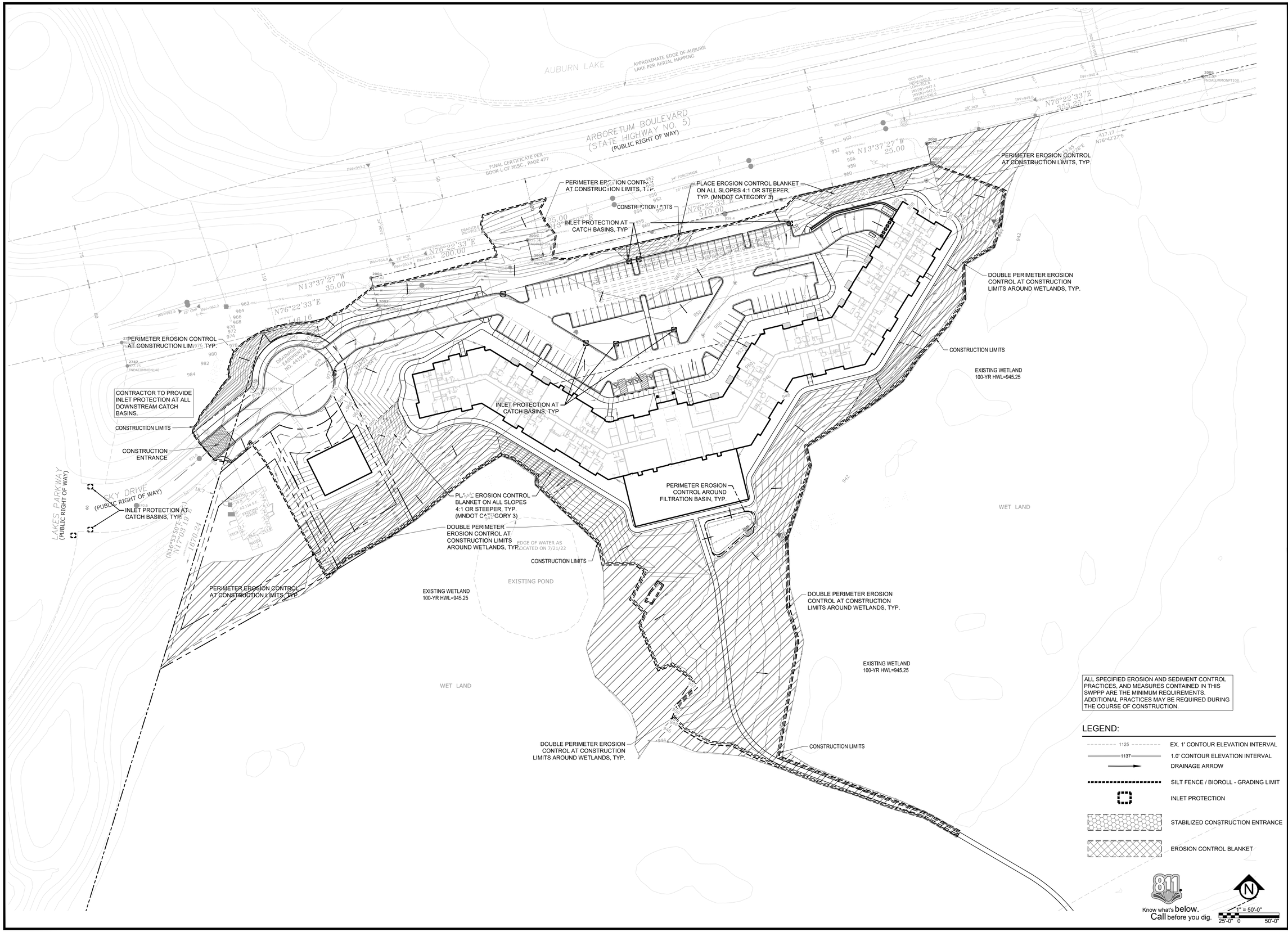
REVISION SUMMARY

DATE	DESCRIPTION

SWPPP - EXISTING CONDITIONS

SW1.0

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



ALL SPECIFIED EROSION AND SEDIMENT CONTROL PRACTICES, AND MEASURES CONTAINED IN THIS SWPPP ARE THE MINIMUM REQUIREMENTS. ADDITIONAL PRACTICES MAY BE REQUIRED DURING THE COURSE OF CONSTRUCTION.

LEGEND:

- 1125 — EX. 1' CONTOUR ELEVATION INTERVAL
- 1137 — 1.0' CONTOUR ELEVATION INTERVAL
- DRAINAGE ARROW
- SILT FENCE / BIOROLL - GRADING LIMIT
- INLET PROTECTION
- STABILIZED CONSTRUCTION ENTRANCE
- EROSION CONTROL BLANKET

Know what's below. Call before you dig.

1" = 50'-0"
25'-0" 0 50'-0"

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES

250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

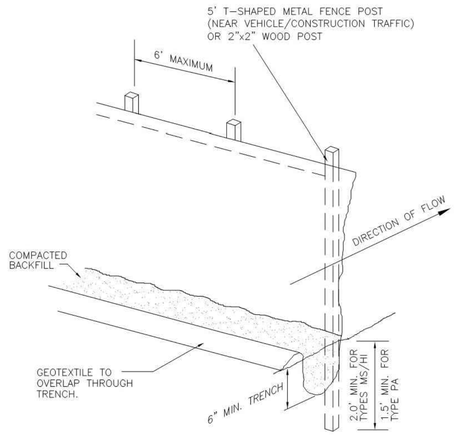
REVISION SUMMARY

DATE	DESCRIPTION

SWPPP - PROPOSED CONDITIONS

SW1.1

© COPYRIGHT 2023 CIVIL SITE GROUP INC.



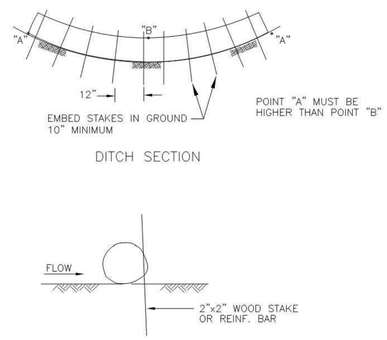
NOTE : -SILT FENCE INSTALLATION SHALL CONFORM TO MNDOT2573.3, TYPE MS/HI NEAR VEHICLE/CONSTRUCTION TRAFFIC, TYPE PA AT ALL OTHER LOCATIONS.
-MATERIALS SHALL CONFORM TO MNDOT 3886.

SILT FENCE

FEBRUARY 2022

CITY OF VICTORIA

STANDARD DRAWING NO. 601 Victoria



NOTE:
STAKE TO BE INSTALLED AT AN ANGLE OF APPROXIMATELY 45° ON THE DOWNSTREAM SIDE OF THE FIBER ROLL. ENSURE THAT STAKE DOES NOT PUSH DOWN THE FIBER ROLL FROM ITS FULL HEIGHT.

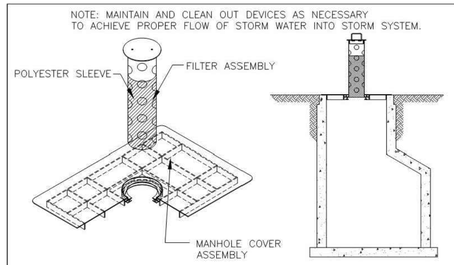
DITCH CHECK (FIBER ROLL)

FEBRUARY 2022

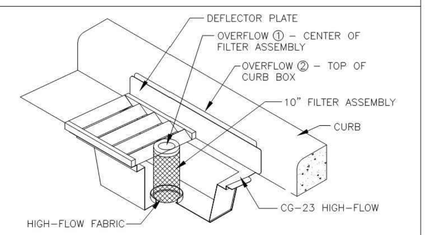
CITY OF VICTORIA

STANDARD DRAWING NO. 603 Victoria

NOTE: MAINTAIN AND CLEAN OUT DEVICES AS NECESSARY TO ACHIEVE PROPER FLOW OF STORM WATER INTO STORM SYSTEM.



WIMCO RD-23 OR APPROVED EQUAL



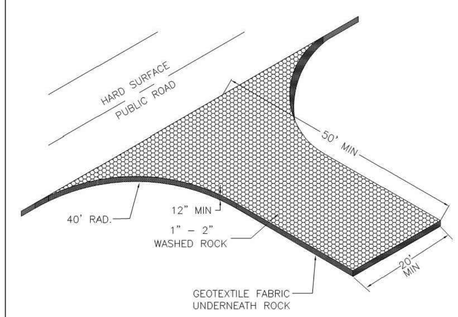
WIMCO CG-23 HIGH-FLOW OR APPROVED EQUAL

SEDIMENT CONTROL AROUND STORM SEWER INLET

FEBRUARY 2022

CITY OF VICTORIA

STANDARD DRAWING NO. 604 Victoria



NOTES:

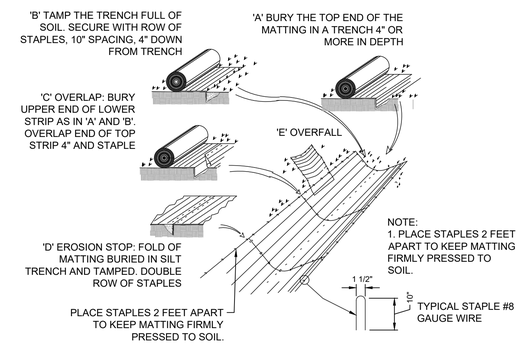
1. MAXIMUM WIDTH OF CONSTRUCTION ENTRANCE IS 24 FEET.
2. A MNDOT 3733 TYPE V GEOTEXTILE FABRIC SHALL BE USED UNDER THE ROCK TO PREVENT MIGRATION OF THE UNDERLYING SOIL INTO THE STONE.
3. CONSTRUCTION ENTRANCE IS REQUIRED FOR ALL NEW HOME CONSTRUCTION AND NEW STREET CONSTRUCTION.
4. CONSTRUCTION ENTRANCE SHALL BE MAINTAINED TO PREVENT TRACKING OF MUD ONTO ROADWAYS THAT ADJOIN THE PROJECT. THIS WILL REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL ROCK OR REMOVAL AND REINSTALLATION OF THE ROCK ENTRANCE.
5. REMOVE MUD AND DEBRIS FROM TIRES AND VEHICLE UNDERCARRIAGE PRIOR TO LEAVING THE SITE.

ROCK CONSTRUCTION ENTRANCE

FEBRUARY 2022

CITY OF VICTORIA

STANDARD DRAWING NO. 605 Victoria



1 EROSION BLANKET

N T S

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT

AMIRA VICTORIA

2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES

250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

SWPPP - DETAILS

SW1.2

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

THE CONTRACTOR AND ALL SUBCONTRACTORS INVOLVED WITH A CONSTRUCTION ACTIVITY THAT DISTURBS SITE SOIL OR WHO IMPLEMENT A POLLUTANT CONTROL MEASURE IDENTIFIED IN THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) MUST COMPLY WITH THE REQUIREMENTS OF THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT (DATED AUGUST 1, 2018 # MNR100001) AND ANY LOCAL GOVERNING AGENCY HAVING JURISDICTION CONCERNING EROSION AND SEDIMENTATION CONTROL.

STORMWATER DISCHARGE DESIGN REQUIREMENTS

SWPPP

THE NATURE OF THIS PROJECT WILL BE CONSISTENT WITH WHAT IS REPRESENTED IN THIS SET OF CONSTRUCTION PLANS AND SPECIFICATIONS. SEE THE SWPPP PLAN SHEETS AND SWPPP NARRATIVE (ATTACHMENT A: CONSTRUCTION SWPPP TEMPLATE) FOR ADDITIONAL SITE SPECIFIC SWPPP INFORMATION. THE PLANS SHOW LOCATIONS AND TYPES OF ALL TEMPORARY AND PERMANENT EROSION PREVENTION AND SEDIMENT CONTROL BMP'S. STANDARD DETAILS ARE ATTACHED TO THIS SWPPP DOCUMENT.

THE INTENDED SEQUENCING OF MAJOR CONSTRUCTION ACTIVITIES IS AS FOLLOWS:
1. INSTALL STABILIZED ROCK CONSTRUCTION ENTRANCE
2. INSTALLATION OF SILT FENCE AROUND SITE
3. INSTALL ORANGE CONSTRUCTION FENCING AROUND INFILTRATION AREAS
4. INSTALL INLET PROTECTION AT ALL ADJACENT AND DOWNSTREAM CATCH BASINS
5. CLEAR AND GRUB FOR TEMPORARY SEDIMENT BASIN / POND INSTALL
6. CONSTRUCT TEMPORARY SEDIMENT BASIN / POND (SECTION 14)
7. CLEAR AND GRUB REMAINDER OF SITE
8. STRIP AND STOCKPILE TOPSOIL
9. ROUGH GRADING OF SITE
10. STABILIZE DENUDED AREAS AND STOCKPILES
11. INSTALL SANITARY SEWER, WATER MAIN STORM SEWER AND SERVICES
12. INSTALL SILT FENCE / INLET PROTECTION AROUND CB'S
13. INSTALL STREET SECTION
14. INSTALL CURB AND GUTTER
15. BITUMINOUS ON STREETS
16. FINAL GRADE BOULEVARD, INSTALL SEED AND MULCH
17. REMOVE ACCUMULATED SEDIMENT FROM BASIN / POND
18. FINAL GRADE POND / INFILTRATION BASINS (DO NOT COMPACT SOILS IN INFILTRATION AREAS.)
19. WHEN ALL CONSTRUCTION ACTIVITY IS COMPLETE AND THE SITE IS STABILIZED BY EITHER SEED OR SOD/LANDSCAPING, REMOVE SILT FENCE AND RESEED ANY AREAS DISTURBED BY THE REMOVAL.

RECORDS RETENTION:

THE SWPPP (ORIGINAL OR COPIES) INCLUDING, ALL CHANGES TO IT, AND INSPECTIONS AND MAINTENANCE RECORDS MUST BE KEPT AT THE SITE DURING CONSTRUCTION BY THE PERMITTEE WHO HAS OPERATIONAL CONTROL OF THAT PORTION OF THE SITE. THE SWPPP CAN BE KEPT IN EITHER THE FIELD OFFICE OR IN AN ON SITE VEHICLE DURING NORMAL WORKING HOURS.

ALL OWNER(S) MUST KEEP THE SWPPP, ALONG WITH THE FOLLOWING ADDITIONAL RECORDS, ON FILE FOR THREE (3) YEARS AFTER SUBMITTAL OF THE NOT AS OUTLINED IN SECTION 4. THIS DOES NOT INCLUDE ANY RECORDS AFTER SUBMITTAL OF THE NOT.

1. THE FINAL SWPPP;
2. ANY OTHER STORMWATER RELATED PERMITS REQUIRED FOR THE PROJECT;
3. RECORDS OF ALL INSPECTION AND MAINTENANCE CONDUCTED DURING CONSTRUCTION (SEE SECTION 11, INSPECTIONS AND MAINTENANCE);
4. ALL PERMANENT OPERATION AND MAINTENANCE AGREEMENTS THAT HAVE BEEN IMPLEMENTED, INCLUDING ALL RIGHT OF WAY, CONTRACTS, COVENANTS AND OTHER BINDING REQUIREMENTS REGARDING PERPETUAL MAINTENANCE; AND
5. ALL REQUIRED CALCULATIONS FOR DESIGN OF THE TEMPORARY AND PERMANENT STORMWATER MANAGEMENT SYSTEMS.

SWPPP IMPLEMENTATION RESPONSIBILITIES:

1. THE OWNER AND CONTRACTOR ARE PERMITTEE(S) AS IDENTIFIED BY THE NPDES PERMIT.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE IMPLEMENTATION OF THE SWPPP, INCLUDING THE ACTIVITIES OF ALL OF THE CONTRACTOR'S SUBCONTRACTORS.
3. CONTRACTOR SHALL PROVIDE A PERSON(S) KNOWLEDGEABLE AND EXPERIENCED IN THE APPLICATION OF EROSION PREVENTION AND SEDIMENT CONTROL BMPS TO OVERSEE ALL INSTALLATION AND MAINTENANCE OF BMPS AND IMPLEMENTATION OF THE SWPPP.
4. CONTRACTOR SHALL PROVIDE PERSON(S) MEETING THE TRAINING REQUIREMENTS OF THE NPDES PERMIT TO CONDUCT INSPECTION AND MAINTENANCE OF ALL EROSION PREVENTION AND SEDIMENT CONTROL BMPS IN ACCORDANCE WITH THE REQUIREMENTS OF THE PERMIT. ONE OF THESE INDIVIDUAL(S) MUST BE AVAILABLE FOR AN ONSITE INSPECTION WITHIN 72 HOURS UPON REQUEST BY MPCA. CONTRACTOR SHALL PROVIDE TRAINING DOCUMENTATION FOR THESE INDIVIDUAL(S) AS REQUIRED BY THE NPDES PERMIT. THIS TRAINING DOCUMENTATION SHALL BE RECORDED IN OR WITH THE SWPPP BEFORE THE START OF CONSTRUCTION OR AS SOON AS THE PERSONNEL FOR THE PROJECT HAVE BEEN DETERMINED. DOCUMENTATION SHALL INCLUDE:
   - 4.1. NAMES OF THE PERSONNEL ASSOCIATED WITH THE PROJECT THAT ARE REQUIRED TO BE TRAINED PER SECTION 21 OF THE PERMIT.
   - 4.2. DATES OF TRAINING AND NAME OF INSTRUCTOR AND ENTITY PROVIDING TRAINING.
   - 4.3. CONTENT OF TRAINING COURSE OR WORKSHOP INCLUDING THE NUMBER OF HOURS OF TRAINING.
5. FOLLOWING FINAL STABILIZATION AND THE TERMINATION OF COVERAGE FOR THE NPDES PERMIT, THE OWNER IS EXPECTED TO FURNISH LONG TERM OPERATION AND MAINTENANCE (O & M) OF THE PERMANENT STORM WATER MANAGEMENT SYSTEM.

CONSTRUCTION ACTIVITY REQUIREMENTS

SWPPP AMENDMENTS (SECTION 6):

1. ONE OF THE INDIVIDUALS DESCRIBED IN ITEM 21.2.A OR ITEM 21.2.B OR ANOTHER QUALIFIED INDIVIDUAL MUST COMPLETE ALL SWPPP CHANGES. CHANGES INVOLVING THE USE OF A LESS STRINGENT BMP MUST INCLUDE A JUSTIFICATION DESCRIBING HOW THE REPLACEMENT BMP IS EFFECTIVE FOR THE SITE CHARACTERISTICS.
2. PERMITTEES MUST AMEND THE SWPPP TO INCLUDE ADDITIONAL OR MODIFIED BMPS AS NECESSARY TO CORRECT PROBLEMS IDENTIFIED OR ADDRESS SITUATIONS WHENEVER THERE IS A CHANGE IN DESIGN, CONSTRUCTION, OPERATION, MAINTENANCE, WEATHER OR SEASONAL CONDITIONS HAVING A SIGNIFICANT EFFECT ON THE DISCHARGE OF POLLUTANTS TO SURFACE WATERS OR GROUNDWATER.
3. PERMITTEES MUST AMEND THE SWPPP TO INCLUDE ADDITIONAL OR MODIFIED BMPS AS NECESSARY TO CORRECT PROBLEMS IDENTIFIED OR ADDRESS SITUATIONS WHENEVER INSPECTIONS OR INVESTIGATIONS BY THE SITE OWNER OR OPERATOR, USEPA OR MPCA OFFICIALS INDICATE THE SWPPP IS NOT EFFECTIVE IN ELIMINATING OR SIGNIFICANTLY MINIMIZING THE DISCHARGE OF POLLUTANTS TO SURFACE WATERS OR GROUNDWATER OR THE DISCHARGES ARE CAUSING WATER QUALITY STANDARD EXCEEDANCES (E.G., NUISANCE CONDITIONS AS DEFINED IN MINN. R. 7050.0210, SUBP. 2) OR THE SWPPP IS NOT CONSISTENT WITH THE OBJECTIVES OF A USEPA APPROVED TMDL.

BMP SELECTION AND INSTALLATION (SECTION 7):

1. PERMITTEES MUST SELECT, INSTALL, AND MAINTAIN THE BMPS IDENTIFIED IN THE SWPPP AND IN THIS PERMIT IN AN APPROPRIATE AND FUNCTIONAL MANNER AND IN ACCORDANCE WITH RELEVANT MANUFACTURER SPECIFICATIONS AND ACCEPTED ENGINEERING PRACTICES.

EROSION PREVENTION (SECTION 8):

1. BEFORE WORK BEGINS, PERMITTEES MUST DELINEATE THE LOCATION OF AREAS NOT TO BE DISTURBED.
2. PERMITTEES MUST MINIMIZE THE NEED FOR DISTURBANCE OF PORTIONS OF THE PROJECT WITH STEEP SLOPES. WHEN STEEP SLOPES MUST BE DISTURBED, PERMITTEES MUST USE TECHNIQUES SUCH AS PHASING AND STABILIZATION PRACTICES DESIGNED FOR STEEP SLOPES (E.G., SLOPE DRAINING AND TERRACING).
3. PERMITTEES MUST STABILIZE ALL EXPOSED SOIL AREAS, INCLUDING STOCKPILES. STABILIZATION MUST BE INITIATED IMMEDIATELY TO LIMIT SOIL EROSION WHEN CONSTRUCTION ACTIVITY HAS PERMANENTLY OR TEMPORARILY CEASED ON ANY PORTION OF THE SITE AND WILL NOT RESUME FOR A PERIOD EXCEEDING 14 CALENDAR DAYS. STABILIZATION MUST BE COMPLETED NO LATER THAN 14 CALENDAR DAYS AFTER THE CONSTRUCTION ACTIVITY HAS CEASED. STABILIZATION IS NOT REQUIRED ON CONSTRUCTED BASE COMPONENTS OF ROADS, PARKING LOTS AND SIMILAR SURFACES. STABILIZATION IS NOT REQUIRED ON TEMPORARY STOCKPILES WITHOUT SIGNIFICANT SILT, CLAY OR ORGANIC COMPONENTS (E.G., CLEAN AGGREGATE STOCKPILES, DEMOLITION CONCRETE STOCKPILES, SAND STOCKPILES) BUT PERMITTEES MUST PROVIDE SEDIMENT CONTROLS AT THE BASE OF THE STOCKPILE.
4. FOR PUBLIC WATERS THAT THE MINNESOTA DNR HAS PROMULGATED "WORK IN WATER RESTRICTIONS" DURING SPECIFIED FISH SPAWNING TIME FRAMES, PERMITTEES MUST COMPLETE STABILIZATION OF ALL EXPOSED SOIL AREAS WITHIN 200 FEET OF THE WATER'S EDGE, AND THAT DRAIN TO THESE WATERS, WITHIN 24 HOURS DURING THE RESTRICTION PERIOD.
5. PERMITTEES MUST STABILIZE THE NORMAL WETTED PERIMETER OF THE LAST 200 LINEAR FEET OF TEMPORARY OR PERMANENT DRAINAGE DITCHES OR SWALES THAT DRAIN WATER FROM THE SITE WITHIN 24 HOURS AFTER CONNECTING TO A SURFACE WATER OR PROPERTY EDGE. PERMITTEES MUST COMPLETE STABILIZATION OF REMAINING PORTIONS OF TEMPORARY OR PERMANENT DITCHES OR SWALES WITHIN 14 CALENDAR DAYS AFTER CONNECTING TO A SURFACE WATER OR PROPERTY EDGE AND CONSTRUCTION IN THAT PORTION OF THE DITCH TEMPORARILY OR PERMANENTLY CEASES.
6. TEMPORARY OR PERMANENT DITCHES OR SWALES BEING USED AS A SEDIMENT CONTAINMENT SYSTEM DURING CONSTRUCTION (WITH PROPERLY DESIGNED ROCK-DITCH CHECKS, BIO ROLLS, SILT DIKES, ETC.) DO NOT NEED TO BE STABILIZED. PERMITTEES MUST STABILIZE THESE AREAS WITHIN 24 HOURS AFTER THEIR USE AS A SEDIMENT CONTAINMENT SYSTEM CEASES
7. PERMITTEES MUST NOT USE MULCH, HYDROMULCH, TACKIFIER, POLYACRYLAMIDE OR SIMILAR EROSION PREVENTION PRACTICES WITHIN ANY PORTION OF THE NORMAL WETTED PERIMETER OF A TEMPORARY OR PERMANENT DRAINAGE DITCH OR SWALE SECTION WITH A CONTINUOUS SLOPE OF GREATER THAN 2 PERCENT.
8. PERMITTEES MUST PROVIDE TEMPORARY OR PERMANENT ENERGY DISSIPATION AT ALL PIPE OUTLETS WITHIN 24 HOURS AFTER CONNECTION TO A SURFACE WATER OR PERMANENT STORMWATER TREATMENT SYSTEM.
9. PERMITTEES MUST NOT DISTURB MORE LAND (I.E., PHASING) THAN CAN BE EFFECTIVELY INSPECTED AND MAINTAINED IN ACCORDANCE WITH SECTION 11.

SEDIMENT CONTROL (SECTION 9):

1. PERMITTEES MUST ESTABLISH SEDIMENT CONTROL BMPS ON ALL DOWNGRADIENT PERIMETERS OF THE SITE AND DOWNGRADIENT AREAS OF THE SITE THAT DRAIN TO ANY SURFACE WATER, INCLUDING CURB AND GUTTER SYSTEMS. PERMITTEES MUST LOCATE SEDIMENT CONTROL PRACTICES UPGRADIENT OF ANY BUFFER ZONES. PERMITTEES MUST INSTALL SEDIMENT CONTROL PRACTICES BEFORE ANY UPGRADIENT LAND-DISTURBING ACTIVITIES BEGIN AND MUST KEEP THE SEDIMENT CONTROL PRACTICES IN PLACE UNTIL THEY ESTABLISH PERMANENT COVER.
2. IF DOWNGRADIENT SEDIMENT CONTROLS ARE OVERLOADED, BASED ON FREQUENT FAILURE OR EXCESSIVE MAINTENANCE REQUIREMENTS, PERMITTEES MUST INSTALL ADDITIONAL UPGRADIENT SEDIMENT CONTROL PRACTICES OR REDUNDANT BMPS TO ELIMINATE THE OVERLOADING AND AMEND THE SWPPP TO IDENTIFY THESE ADDITIONAL PRACTICES AS REQUIRED IN ITEM 6.3.
3. TEMPORARY OR PERMANENT DRAINAGE DITCHES AND SEDIMENT BASINS DESIGNED AS PART OF A SEDIMENT CONTAINMENT SYSTEM (E.G., DITCHES WITH ROCK-CHECK DAMS) REQUIRE SEDIMENT CONTROL PRACTICES ONLY AS APPROPRIATE FOR SITE CONDITIONS.
4. A FLOATING SILT CURTAIN PLACED IN THE WATER IS NOT A SEDIMENT CONTROL BMP TO SATISFY ITEM 9.2 EXCEPT WHEN WORKING ON A SHORELINE OR BELOW THE WATERLINE. IMMEDIATELY AFTER THE SHORT TERM CONSTRUCTION ACTIVITY (E.G., INSTALLATION OF RIP RAP ALONG THE SHORELINE) IN THAT AREA IS COMPLETE, PERMITTEES MUST INSTALL AN UPLAND PERIMETER CONTROL PRACTICE IF EXPOSED SOILS STILL DRAIN TO A SURFACE WATER.
5. PERMITTEES MUST RE-INSTALL ALL SEDIMENT CONTROL PRACTICES ADJUSTED OR REMOVED TO ACCOMMODATE SHORT-TERM ACTIVITIES SUCH AS CLEARING OR GRUBBING, OR PASSAGE OF VEHICLES, IMMEDIATELY AFTER THE SHORT-TERM ACTIVITY IS COMPLETED. PERMITTEES MUST RE-INSTALL SEDIMENT CONTROL PRACTICES BEFORE THE NEXT PRECIPITATION EVENT EVEN IF THE SHORT-TERM ACTIVITY IS NOT COMPLETE.
6. PERMITTEES MUST PROTECT ALL STORM DRAIN INLETS USING APPROPRIATE BMPS DURING CONSTRUCTION UNTIL THEY ESTABLISH PERMANENT COVER ON ALL AREAS WITH POTENTIAL FOR DISCHARGING TO THE INLET.
7. PERMITTEES MAY REMOVE INLET PROTECTION FOR A PARTICULAR INLET IF A SPECIFIC SAFETY CONCERN (E.G. STREET FLOODING/FREEZING) IS IDENTIFIED BY THE PERMITTEES OR THE JURISDICTIONAL AUTHORITY (E.G., CITY/COUNTY/TOWNSHIP/MINNESOTA DEPARTMENT OF TRANSPORTATION ENGINEER). PERMITTEES MUST DOCUMENT THE NEED FOR REMOVAL IN THE SWPPP.
8. PERMITTEES MUST PROVIDE SILT FENCE OR OTHER EFFECTIVE SEDIMENT CONTROLS AT THE BASE OF STOCKPILES ON THE DOWNGRADIENT PERIMETER.
9. PERMITTEES MUST LOCATE STOCKPILES OUTSIDE OF NATURAL BUFFERS OR SURFACE WATERS, INCLUDING STORMWATER CONVEYANCES SUCH AS CURB AND GUTTER SYSTEMS UNLESS THERE IS A BYPASS IN PLACE FOR THE STORMWATER.
10. PERMITTEES MUST INSTALL A VEHICLE TRACKING BMP TO MINIMIZE THE TRACK OUT OF SEDIMENT FROM THE CONSTRUCTION SITE OR ONTO PAVED ROADS WITHIN THE SITE.
11. PERMITTEES MUST USE STREET SWEEPING IF VEHICLE TRACKING BMPS ARE NOT ADEQUATE TO PREVENT SEDIMENT TRACKING ONTO THE STREET.
12. PERMITTEES MUST INSTALL TEMPORARY SEDIMENT BASINS AS REQUIRED IN SECTION 14.
13. IN ANY AREAS OF THE SITE WHERE FINAL VEGETATIVE STABILIZATION WILL OCCUR, PERMITTEES MUST RESTRICT VEHICLE AND EQUIPMENT USE TO MINIMIZE SOIL COMPACTION.
14. PERMITTEES MUST PRESERVE TOPSOIL ON THE SITE, UNLESS INFEASIBLE.
15. PERMITTEES MUST DIRECT DISCHARGES FROM BMPS TO VEGETATED AREAS UNLESS INFEASIBLE.
16. PERMITTEES MUST PRESERVE A 50 FOOT NATURAL BUFFER OR, IF A BUFFER IS INFEASIBLE ON THE SITE, PROVIDE REDUNDANT (DOUBLE) PERIMETER SEDIMENT CONTROLS WHEN A SURFACE WATER IS LOCATED WITHIN 50 FEET OF THE PROJECT'S EARTH DISTURBANCES AND STORMWATER FLOWS TO THE SURFACE WATER. PERMITTEES MUST INSTALL PERIMETER SEDIMENT CONTROLS AT LEAST 5 FEET APART UNLESS LIMITED BY LACK OF AVAILABLE SPACE. NATURAL BUFFERS ARE NOT REQUIRED ADJACENT TO ROAD DITCHES, JUDICIAL DITCHES, COUNTY DITCHES, STORMWATER CONVEYANCE CHANNELS, STORM DRAIN INLETS, AND SEDIMENT BASINS. IF PRESERVING THE BUFFER IS INFEASIBLE, PERMITTEES MUST DOCUMENT THE REASONS IN THE SWPPP. SHEET PILING IS A REDUNDANT PERIMETER CONTROL IF INSTALLED IN A MANNER THAT RETAINS ALL STORMWATER.
17. PERMITTEES MUST USE POLYMERS, FLOCCULANTS, OR OTHER SEDIMENTATION TREATMENT CHEMICALS IN ACCORDANCE WITH ACCEPTED ENGINEERING PRACTICES, DOSING SPECIFICATIONS AND SEDIMENT REMOVAL DESIGN SPECIFICATIONS PROVIDED BY THE MANUFACTURER OR SUPPLIER. THE PERMITTEES MUST USE CONVENTIONAL EROSION AND SEDIMENT CONTROLS PRIOR TO CHEMICAL ADDITION AND MUST DIRECT TREATED STORMWATER TO A SEDIMENT CONTROL SYSTEM FOR FILTRATION OR SETTLEMENT OF THE FLOC PRIOR TO DISCHARGE.

DEWATERING AND BASIN DRAINING (SECTION 10):

1. PERMITTEES MUST DISCHARGE TURBID OR SEDIMENT-LADEN WATERS RELATED TO DEWATERING OR BASIN DRAINING (E.G., PUMPED DISCHARGES, TRENCH/DITCH CUTS FOR DRAINAGE) TO A TEMPORARY OR PERMANENT SEDIMENT BASIN ON THE PROJECT SITE UNLESS INFEASIBLE. PERMITTEES MAY DEWATER TO SURFACE WATERS IF THEY VISUALLY CHECK TO ENSURE ADEQUATE TREATMENT HAS BEEN OBTAINED AND NUISANCE CONDITIONS (SEE MINN. R. 7050.0210, SUBP. 2) WILL NOT RESULT FROM THE DISCHARGE. IF PERMITTEES CANNOT DISCHARGE THE WATER TO A SEDIMENTATION BASIN PRIOR TO ENTERING A SURFACE WATER, PERMITTEES MUST TREAT IT WITH APPROPRIATE BMPS SUCH THAT THE DISCHARGE DOES NOT ADVERSELY AFFECT THE SURFACE WATER OR DOWNSTREAM PROPERTIES.
2. IF PERMITTEES MUST DISCHARGE WATER CONTAINING OIL OR GREASE, THEY MUST USE AN OIL-WATER SEPARATOR OR SUITABLE FILTRATION DEVICE (E.G., CARTRIDGE FILTERS, ABSORBENTS PADS) PRIOR TO DISCHARGE.
3. PERMITTEES MUST DISCHARGE ALL WATER FROM DEWATERING OR BASIN-DRAINING ACTIVITIES IN A MANNER THAT DOES NOT CAUSE EROSION OR SCOUR IN THE IMMEDIATE VICINITY OF DISCHARGE POINTS OR INUNDATION OF WETLANDS IN THE IMMEDIATE VICINITY OF DISCHARGE POINTS THAT CAUSES SIGNIFICANT ADVERSE IMPACT TO THE WETLAND.
4. IF PERMITTEES USE FILTERS WITH BACKWASH WATER, THEY MUST HAUL THE BACKWASH WATER AWAY FOR DISPOSAL, RETURN THE BACKWASH WATER TO THE BEGINNING OF THE TREATMENT PROCESS, OR INCORPORATE THE BACKWASH WATER INTO THE SITE IN A MANNER THAT DOES NOT CAUSE EROSION.

INSPECTIONS AND MAINTENANCE (SECTION 11):

1. PERMITTEES MUST ENSURE A TRAINED PERSON, AS IDENTIFIED IN ITEM 21.2.B, WILL INSPECT THE ENTIRE CONSTRUCTION SITE AT LEAST ONCE EVERY SEVEN (7) DAYS DURING ACTIVE CONSTRUCTION AND WITHIN 24 HOURS AFTER A RAINFALL EVENT GREATER THAN 1/2 INCH IN 24 HOURS.
2. PERMITTEES MUST INSPECT AND MAINTAIN ALL PERMANENT STORMWATER TREATMENT BMPS.
3. PERMITTEES MUST INSPECT ALL EROSION PREVENTION AND SEDIMENT CONTROL BMPS AND POLLUTION PREVENTION MANAGEMENT MEASURES TO ENSURE INTEGRITY AND EFFECTIVENESS. PERMITTEES MUST REPAIR, REPLACE OR SUPPLEMENT ALL NONFUNCTIONAL BMPS WITH FUNCTIONAL BMPS BY THE END OF THE NEXT BUSINESS DAY AFTER DISCOVERY UNLESS ANOTHER TIME FRAME IS SPECIFIED IN ITEM 11.5 OR 11.6. PERMITTEES MAY TAKE ADDITIONAL TIME IF FIELD CONDITIONS PREVENT ACCESS TO THE AREA.
4. DURING EACH INSPECTION, PERMITTEES MUST INSPECT SURFACE WATERS, INCLUDING DRAINAGE DITCHES AND CONVEYANCE SYSTEMS BUT NOT CURB AND GUTTER SYSTEMS, FOR EVIDENCE OF EROSION AND SEDIMENT DEPOSITION. PERMITTEES MUST REMOVE ALL DELTAS AND SEDIMENT DEPOSITED IN SURFACE WATERS, INCLUDING DRAINAGE WAYS, CATCH BASINS, AND OTHER DRAINAGE SYSTEMS AND RESTABILIZE THE AREAS WHERE SEDIMENT REMOVAL RESULTS IN EXPOSED SOIL. PERMITTEES MUST COMPLETE REMOVAL AND STABILIZATION WITHIN SEVEN (7) CALENDAR DAYS OF DISCOVERY UNLESS PRECLUDED BY LEGAL, REGULATORY, OR PHYSICAL ACCESS CONSTRAINTS. PERMITTEES MUST USE ALL REASONABLE EFFORTS TO OBTAIN ACCESS. IF PRECLUDED, REMOVAL AND STABILIZATION MUST TAKE PLACE WITHIN SEVEN (7) DAYS OF OBTAINING ACCESS. PERMITTEES ARE RESPONSIBLE FOR CONTACTING ALL LOCAL, REGIONAL, STATE AND FEDERAL AUTHORITIES AND RECEIVING ANY APPLICABLE PERMITS, PRIOR TO CONDUCTING ANY WORK IN SURFACE WATERS.
5. PERMITTEES MUST INSPECT CONSTRUCTION SITE VEHICLE EXIT LOCATIONS, STREETS AND CURB AND GUTTER SYSTEMS WITHIN AND ADJACENT TO THE PROJECT FOR SEDIMENTATION FROM EROSION OR TRACKED SEDIMENT FROM VEHICLES. PERMITTEES MUST REMOVE SEDIMENT FROM ALL PAVED SURFACES WITHIN ONE (1) CALENDAR DAY OF DISCOVERY OR, IF APPLICABLE, WITHIN A SHORTER TIME TO AVOID A SAFETY HAZARD TO USERS OF PUBLIC STREETS.
6. PERMITTEES MUST REPAIR, REPLACE OR SUPPLEMENT ALL PERIMETER CONTROL DEVICES WHEN THEY BECOME NONFUNCTIONAL OR THE SEDIMENT REACHES 1/2 OF THE HEIGHT OF THE DEVICE.
7. PERMITTEES MUST DRAIN TEMPORARY AND PERMANENT SEDIMENTATION BASINS AND REMOVE THE SEDIMENT WHEN THE DEPTH OF SEDIMENT COLLECTED IN THE BASIN REACHES 1/2 THE STORAGE VOLUME.
8. PERMITTEES MUST ENSURE THAT AT LEAST ONE INDIVIDUAL PRESENT ON THE SITE (OR AVAILABLE TO THE PROJECT SITE IN THREE (3) CALENDAR DAYS) IS TRAINED IN THE JOB DUTIES DESCRIBED IN ITEM 21.2.B.
9. PERMITTEES MAY ADJUST THE INSPECTION SCHEDULE DESCRIBED IN ITEM 11.2 AS FOLLOWS:
   a. INSPECTIONS OF AREAS WITH PERMANENT COVER CAN BE REDUCED TO ONCE PER MONTH, EVEN IF CONSTRUCTION ACTIVITY CONTINUES ON OTHER PORTIONS OF THE SITE; OR
   b. WHERE SITES HAVE PERMANENT COVER ON ALL EXPOSED SOIL AND NO CONSTRUCTION ACTIVITY IS OCCURRING ANYWHERE ON THE SITE, INSPECTIONS CAN BE REDUCED TO ONCE PER MONTH AND, AFTER 12 MONTHS, MAY BE SUSPENDED COMPLETELY UNTIL CONSTRUCTION ACTIVITY RESUMES. THE MPCA MAY REQUIRE INSPECTIONS TO RESUME IF CONDITIONS WARRANT; OR
   c. WHERE CONSTRUCTION ACTIVITY HAS BEEN SUSPENDED DUE TO FROZEN GROUND CONDITIONS, INSPECTIONS MAY BE SUSPENDED. INSPECTIONS MUST RESUME WITHIN 24 HOURS OF RUNOFF OCCURRING, OR UPON RESUMING CONSTRUCTION, WHICHEVER COMES FIRST.
10. PERMITTEES MUST RECORD ALL INSPECTIONS AND MAINTENANCE ACTIVITIES WITHIN 24 HOURS OF BEING CONDUCTED AND THESE RECORDS MUST BE RETAINED WITH THE SWPPP. THESE RECORDS MUST INCLUDE:
   a. DATE AND TIME OF INSPECTIONS; AND
   b. NAME OF PERSONS CONDUCTING INSPECTIONS; AND
   c. ACCURATE FINDINGS OF INSPECTIONS, INCLUDING THE SPECIFIC LOCATION WHERE CORRECTIVE ACTIONS ARE NEEDED; AND
   d. CORRECTIVE ACTIONS TAKEN (INCLUDING DATES, TIMES, AND PARTY COMPLETING MAINTENANCE ACTIVITIES); AND
   e. DATE OF ALL RAINFALL EVENTS GREATER THAN 1/2 INCHES IN 24 HOURS, AND THE AMOUNT OF RAINFALL FOR EACH EVENT. PERMITTEES MUST OBTAIN RAINFALL AMOUNTS BY EITHER A PROPERLY MAINTAINED RAIN GAUGE INSTALLED ONSITE, A WEATHER STATION THAT IS WITHIN ONE (1) MILE OF YOUR LOCATION, OR A WEATHER REPORTING SYSTEM THAT PROVIDES SITE SPECIFIC RAINFALL DATA FROM RADAR SUMMARIES; AND
   f. IF PERMITTEES OBSERVE A DISCHARGE DURING THE INSPECTION, THEY MUST RECORD AND SHOULD PHOTOGRAPH AND DESCRIBE THE LOCATION OF THE DISCHARGE (I.E., COLOR, ODOR, SETTLED OR SUSPENDED SOLIDS, OIL SHEEN, AND OTHER OBVIOUS INDICATORS OF POLLUTANTS); AND
   g. ANY AMENDMENTS TO THE SWPPP PROPOSED AS A RESULT OF THE INSPECTION MUST BE DOCUMENTED AS REQUIRED IN SECTION 6 WITHIN SEVEN (7) CALENDAR DAYS.

POLLUTION PREVENTION MANAGEMENT (SECTION 12):

1. PERMITTEES MUST PLACE BUILDING PRODUCTS AND LANDSCAPE MATERIALS UNDER COVER (E.G., PLASTIC SHEETING OR TEMPORARY ROOFS) OR PROTECT THEM BY SIMILARLY EFFECTIVE MEANS DESIGNED TO MINIMIZE CONTACT WITH STORMWATER. PERMITTEES ARE NOT REQUIRED TO COVER OR PROTECT PRODUCTS WHICH ARE EITHER NOT A SOURCE OF CONTAMINATION TO STORMWATER OR ARE DESIGNED TO BE EXPOSED TO STORMWATER.
2. PERMITTEES MUST PLACE PESTICIDES, FERTILIZERS AND TREATMENT CHEMICALS UNDER COVER (E.G., PLASTIC SHEETING OR TEMPORARY ROOFS) OR PROTECT THEM BY SIMILARLY EFFECTIVE MEANS DESIGNED TO MINIMIZE CONTACT WITH STORMWATER.
3. PERMITTEES MUST STORE HAZARDOUS MATERIALS AND TOXIC WASTE, (INCLUDING OIL, DIESEL FUEL, GASOLINE, HYDRAULIC FLUIDS, PAINT SOLVENTS, PETROLEUM-BASED PRODUCTS, WOOD PRESERVATIVES, ADDITIVES, CURING COMPOUNDS, AND ACIDS) IN SEALED CONTAINERS TO PREVENT SPILLS, LEAKS OR OTHER DISCHARGE. STORAGE AND DISPOSAL OF HAZARDOUS WASTE MATERIALS MUST BE IN COMPLIANCE WITH MINN. R. CH. 7045 INCLUDING SECONDARY CONTAINMENT AS APPLICABLE.
4. PERMITTEES MUST PROPERLY STORE, COLLECT AND DISPOSE SOLID WASTE IN COMPLIANCE WITH MINN. R. CH. 7035.
5. PERMITTEES MUST POSITION PORTABLE TOILETS SO THEY ARE SECURE AND WILL NOT TIP OR BE KNOCKED OVER. PERMITTEES MUST PROPERLY DISPOSE SANITARY WASTE IN ACCORDANCE WITH MINN. R. CH. 7041.
6. PERMITTEES MUST TAKE REASONABLE STEPS TO PREVENT THE DISCHARGE OF SPILLED OR LEAKED CHEMICALS, INCLUDING FUEL, FROM ANY AREA WHERE CHEMICALS OR FUEL WILL BE LOADED OR UNLOADED INCLUDING THE USE OF DRIP PANS OR ABSORBENTS UNLESS INFEASIBLE. PERMITTEES MUST ENSURE ADEQUATE SUPPLIES ARE AVAILABLE AT ALL TIMES TO CLEAN UP DISCHARGED MATERIALS AND THAT AN APPROPRIATE DISPOSAL METHOD IS AVAILABLE FOR RECOVERED SPILLED MATERIALS. PERMITTEES MUST REPORT AND CLEAN UP SPILLS IMMEDIATELY AS REQUIRED BY MINN. STAT. 115.061, USING DRY CLEAN UP MEASURES WHERE POSSIBLE.
7. PERMITTEES MUST LIMIT VEHICLE EXTERIOR WASHING AND EQUIPMENT TO A DEFINED AREA OF THE SITE. PERMITTEES MUST CONTAIN RUNOFF FROM THE WASHING AREA IN A SEDIMENT BASIN OR OTHER SIMILARLY EFFECTIVE CONTROLS AND MUST DISPOSE WASTE FROM THE WASHING ACTIVITY PROPERLY. PERMITTEES MUST PROPERLY USE AND STORE SOAPS, DETERGENTS, OR SOLVENTS.
8. PERMITTEES MUST PROVIDE EFFECTIVE CONTAINMENT FOR ALL LIQUID AND SOLID WASTES GENERATED BY WASHOUT OPERATIONS (E.G., CONCRETE, STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS) RELATED TO THE CONSTRUCTION ACTIVITY. PERMITTEES MUST PREVENT LIQUID AND SOLID WASHOUT WASTES FROM CONTACTING THE GROUND AND MUST DESIGN THE CONTAINMENT SO IT DOES NOT RESULT IN RUNOFF FROM THE WASHOUT OPERATIONS OR AREAS. PERMITTEES MUST PROPERLY DISPOSE LIQUID AND SOLID WASTES IN COMPLIANCE WITH MPCA RULES. PERMITTEES MUST INSTALL A SIGN INDICATING THE LOCATION OF THE WASHOUT FACILITY.

PERMIT TERMINATION (SECTION 4 AND SECTION 13):

1. PERMITTEES MUST SUBMIT A NOT WITHIN 30 DAYS AFTER ALL TERMINATION CONDITIONS LISTED IN SECTION 13 ARE COMPLETE.
2. PERMITTEES MUST SUBMIT A NOT WITHIN 30 DAYS AFTER SELLING OR OTHERWISE LEGALLY TRANSFERRING THE ENTIRE SITE, INCLUDING PERMIT RESPONSIBILITY FOR ROADS (E.G., STREET SWEEPING) AND STORMWATER INFRASTRUCTURE FINAL CLEAN OUT, OR TRANSFERRING PORTIONS OF A SITE TO ANOTHER PARTY. THE PERMITTEES' COVERAGE UNDER THIS PERMIT TERMINATES AT MIDNIGHT ON THE SUBMISSION DATE OF THE NOT.
3. PERMITTEES MUST COMPLETE ALL CONSTRUCTION ACTIVITY AND MUST INSTALL PERMANENT COVER OVER ALL AREAS PRIOR TO SUBMITTING THE NOT. VEGETATIVE COVER MUST CONSIST OF A UNIFORM PERENNIAL VEGETATION WITH A DENSITY OF 70 PERCENT OF ITS EXPECTED FINAL GROWTH. VEGETATION IS NOT REQUIRED WHERE THE FUNCTION OF A SPECIFIC AREA DICTATES NO VEGETATION, SUCH AS IMPERVIOUS SURFACES OR THE BASE OF A SAND FILTER.
4. PERMITTEES MUST CLEAN THE PERMANENT STORMWATER TREATMENT SYSTEM OF ANY ACCUMULATED SEDIMENT AND MUST ENSURE THE SYSTEM MEETS ALL APPLICABLE REQUIREMENTS IN SECTION 15 THROUGH 19 AND IS OPERATING AS DESIGNED.
5. PERMITTEES MUST REMOVE ALL SEDIMENT FROM CONVEYANCE SYSTEMS PRIOR TO SUBMITTING THE NOT.
6. PERMITTEES MUST REMOVE ALL TEMPORARY SYNTHETIC EROSION PREVENTION AND SEDIMENT CONTROL BMPS PRIOR TO SUBMITTING THE NOT. PERMITTEES MAY LEAVE BMPS DESIGNED TO DECOMPOSE ON-SITE IN PLACE.
7. FOR RESIDENTIAL CONSTRUCTION ONLY, PERMIT COVERAGE TERMINATES ON INDIVIDUAL LOTS IF THE STRUCTURES ARE FINISHED AND TEMPORARY EROSION PREVENTION AND DOWNGRADIENT PERIMETER CONTROL IS COMPLETE, THE RESIDENCE SELLS TO THE HOMEOWNER, AND THE PERMITTEE DISTRIBUTES THE MPCA'S "HOMEOWNER FACT SHEET" TO THE HOMEOWNER.
8. FOR CONSTRUCTION PROJECTS ON AGRICULTURAL LAND (E.G., PIPELINES ACROSS CROPLAND), PERMITTEES MUST RETURN THE DISTURBED LAND TO ITS PRECONSTRUCTION AGRICULTURAL USE PRIOR TO SUBMITTING THE NOT.

SEED NOTES:

ALL SEED MIXES AND APPLICATION SHALL BE IN ACCORDANCE WITH THE MNDOT SEEDING MANUAL.

GENERAL RECOMMENDATIONS:
THE CONTRACTOR IS RESPONSIBLE TO SALVAGE AND PRESERVE EXISTING TOPSOIL NECESSARY FOR FINAL STABILIZATION AND TO ALSO MINIMIZE COMPACTION IN ALL LANDSCAPE AREAS. IMMEDIATELY BEFORE SEEDING THE SOIL SHALL BE TILLED TO A MINIMUM DEPTH OF 3 INCHES.

TEMPORARY EROSION CONTROL SEEDING, MULCHING & BLANKET.

SEED
- TEMPORARY SEED SHALL BE MNDOT SEED MIX 21-112 (WINTER WHEAT COVER CROP) FOR WINTER AND 21-111 (OATS COVER CROP) FOR SPRING/SUMMER APPLICATIONS. BOTH SEED MIXES SHALL BE APPLIED AT A SEEDING RATE OF 100 LBS/ACRE.

MULCH
- IMMEDIATELY AFTER SEEDING, WITHIN 24 HOURS, MNDOT TYPE 1 MULCH SHOULD BE APPLIED TO PROTECT AND ENHANCE SEED GERMINATION. MULCH SHALL BE APPLIED AT 90% COVERAGE (2 TONS PER ACRE OF STRAW MULCH)

SLOPES
- 3:1 (HORIZ/VERT.) OR FLATTER MUCH SHALL BE COVERED WITH MULCH
- SLOPES STEEPER THAN 3:1 OR DITCH BOTTOMS SHALL BE COVERED WITH EROSION CONTROL BLANKET.
- SEE PLAN FOR MORE DETAILED DITCH AND STEEP SLOPE EROSION CONTROL TREATMENTS.

TRAINING SECTION 21

DESIGN ENGINEER: DAVID J. KNAEBLE P.E.
TRAINING COURSE: DESIGN OF SWPPP
TRAINING ENTITY: UNIVERSITY OF MINNESOTA
INSTRUCTOR: JOHN CHAPMAN
DATES OF TRAINING COURSE: 8/22/2012- 8/23/2012
TOTAL TRAINING HOURS: 12
DATE OF RECERTIFICATION: 4/22/22
EXPIRATION: 5/31/2025

OWNER INFORMATION

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500
MINNEAPOLIS, MN 55401
DAVE YOUNG
952-835-5300

SWPPP CONTACT PERSON

CONTRACTOR:

SWPPP INSPECTOR TRAINING:
ALL SWPPP INSPECTIONS MUST BE PERFORMED BY A PERSON THAT MEETS THE TRAINING REQUIREMENTS OF THE NPDES CONSTRUCTION SITE PERMIT. TRAINING CREDENTIALS SHALL BE PROVIDED BY THE CONTRACTOR AND KEPT ON SITE WITH THE SWPPP

PARTY RESPONSIBLE FOR LONG TERM OPERATION AND MAINTENANCE OF PERMANENT STORM WATER MANAGEMENT SYSTEM

PERMANENT STORMWATER MANAGEMENT IS NOT REQUIRED AS PART OF THIS PROJECT TO MEET NPDES PERMIT REQUIREMENTS. THE PROPERTY OWNER IS RESPONSIBLE FOR THE LONG TERM OPERATION AND MAINTENANCE OF THE PROPOSED STORMWATER SYSTEM.

SWPPP ATTACHMENTS (ONLY APPLICABLE IF SITE IS 1 ACRE OR GREATER):

CONTRACTOR SHALL OBTAIN A COPY OF THE FOLLOWING SWPPP ATTACHMENTS WHICH ARE A PART OF THE OVERALL SWPPP PACKAGE:
ATTACHMENT A. CONSTRUCTION SWPPP TEMPLATE - SITE SPECIFIC SWPPP DOCUMENT
ATTACHMENT B. CONSTRUCTION STORMWATER INSPECTION CHECKLIST
ATTACHMENT C. MAINTENANCE PLAN FOR PERMANENT STORM WATER TREATMENT SYSTEMS
ATTACHMENT D: STORMWATER MANAGEMENT REPORT - ON FILE AT THE OFFICE OF PROJECT ENGINEER. AVAILABLE UPON REQUEST.
ATTACHMENT E: GEOTECHNICAL EVALUATION REPORT - ON FILE AT THE OFFICE OF PROJECT ENGINEER. AVAILABLE UPON REQUEST.

SUPPLEMENTARY SITE SPECIFIC EROSION CONTROL NOTES:

THESE NOTES SUPERCEDE ANY GENERAL SWPPP NOTES.

THIS PROJECT IS GREATER THAN 1.0 ACRES SO AN NPDES PERMIT IS REQUIRED AND NEEDS TO BE SUBMITTED TO THE MPCA. THE CONTRACTOR IS REQUIRED TO FOLLOW THE GUIDELINES IN THE NPDES PERMIT THROUGHOUT CONSTRUCTION.

PROJECT NARRATIVE:

PROJECT IS A REDEVELOPMENT OF AN EXISTING SINGLE RESIDENTIAL FAMILY PROPERTY INTO A 147-UNIT SENIOR LIVING ARARTMENT BUILDING AND PARKING. SITE, GRADING, UTILITY AND LANDSCAPE IMPROVEMENTS WILL OCCUR.

NATIVE BUFFER NARRATIVE:

PRESERVING A 50 FOOT NATURAL BUFFER AROUND WATER BODIES IS NOT PROVIDED IN THESE PLANS DUE TO GRADING REQUIRED ADJACENT TO THE EXISTING WATER BODY. REDUNDANT PERIMETER EROSION CONTROL WILL BE PROVIDED WHEN A SURFACE WATER BODY IS LOCATED WITHIN 50 FEET OF THE PROJECTS DISTURBANCE.

INFILTRATION NARRATIVE:

INFILTRATION IS NOT PROVIDED AS PART OF THE PROJECT'S PERMANENT STORMWATER MANAGEMENT SYSTEM DUE TO THE TYPES OF SOILS PRESENT. THE SOILS PRESENT ARE CONSIDERED HYDROLOGIC SOIL GROUP "D" AND ARE NOT CONDUCIVE TO INFILTRATION. FILTRATION WILL BE PROVIDED IN LIEU OF INFILTRATION.

SOIL CONTAMINATION NARRATIVE:

SOILS ONSITE HAVE NOT BEEN IDENTIFIED AS CONTAMINATED.

SPECIAL TMDL BMP REQUIREMENTS SITE SPECIFIC (IF REQUIRED):

THIS PROJECT IS WITHIN ONE MILE AND DISCHARGES TO EAST AUBURN LAKE - EAST AUBURN LAKE IS IDENTIFIED AS AN IMPAIRED WATER BODY PER THE MPCA'S 303(D) IMPAIRED WATERS LIST. EAST AUBURN LAKE IS IMPAIRED FOR NUTRIENT EUTROPHICATION BIOLOGICAL INDICATORS. BECAUSE THIS WATER BODY IS LOCATED WITHIN ONE MILE OF THE SITE, BMPS AS DEFINED IN THE NPDES PERMIT ITEMS 23.9 AND 23.10 APPLY. THESE ARE AS FOLLOWS:

1. DURING CONSTRUCTION:
   A. STABILIZATION OF ALL EXPOSED SOIL AREAS MUST BE INITIATED IMMEDIATELY TO LIMIT SOIL EROSION BUT IN NO CASE COMPLETED LATER THAN SEVEN (7) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.
   B. TEMPORARY SEDIMENT BASIN REQUIREMENTS DESCRIBED IN SECTION 14. MUST BE USED FOR COMMON DRAINAGE LOCATIONS THAT SERVE AN AREA WITH FIVE (5) OR MORE ACRES DISTURBED AT ONE TIME.

PERMANENT STABILIZATION NOTES SITE SPECIFIC:

PERMANENT SEED MIX
- FOR THIS PROJECT ALL AREAS THAT ARE NOT TO BE SODDED OR LANDSCAPED SHALL RECEIVE A NATIVE PERMANENT SEED MIX.
  - AREAS IN BUFFERS AND ADJACENT TO OR IN WET AREAS MNDOT SEED MIX 33-261 (STORMWATER SOUTH AND WEST) AT 35 LBS PER ACRE.
  - DRY AREAS MNDOT SEED MIX 35-221 (DRY PRAIRIE GENERAL) AT 40 LBS PER ACRE.
- MAINTENANCE SHALL BE IN ACCORDANCE TO THE MNDOT SEEDING MANUAL.

AREAS AND QUANTITIES:

SITE AREA CALCULATIONS	EXISTING CONDITION		PROPOSED LOT 1		PROPOSED LOT 2		PROPOSED LOT 3		PUBLIC ROW	
BUILDING COVERAGE	5,820 SF	0.2%	53,310 SF	2.2%	3,250 SF	16.9%	2,236 SF	7.5%	0 SF	0.0%
ALL PAVEMENTS	11,143 SF	0.5%	77,743 SF	3.2%	908 SF	4.7%	1,279 SF	4.3%	10,246 SF	72.2%
ALL NON-PAVEMENTS	2,441,677 SF	99.3%	2,264,410 SF	94.5%	15,026 SF	78.3%	26,291 SF	88.2%	3,941 SF	27.8%
TOTAL SITE AREA	2,458,640 SF	100.0%	2,395,463 SF	100.0%	19,184 SF	100.0%	29,806 SF	100.0%	14,187 SF	100.0%

IMPERVIOUS SURFACE		
EXISTING CONDITION	16,963 SF	0.7%
PROPOSED CONDITION	148,972 SF	6.1%
DIFFERENCE (EX. VS PROP.)	132,009 SF	5.4%

EROSION CONTROL QUANTITIES		
DISTURBED AREA	333,000 SF	7.6 AC
SILT FENCE/BIO-ROLL	±6200 LF	
EROSION CONTROL BLANKET	±16400 SF	
INLET PROTECTION DEVICES	±13 EA	

NOTE: QUANTITIES ARE FOR INFORMATIONAL PURPOSES ONLY. CONTRACTOR SHALL DETERMINE FOR THEMSELVES THE EXACT QUANTITIES FOR BIDDING AND CONSTRUCTION.

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386
UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY	
DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY	
DATE	DESCRIPTION

SWPPP - NARRATIVE

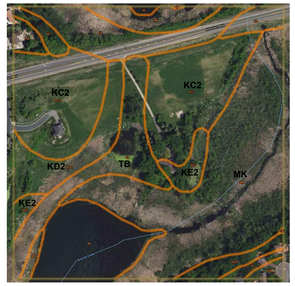
SW1.3

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

ATTACHMENT A: SITE SPECIFIC SWPPP DOCUMENT

PROJECT LOCATION			
ADDRESS	2285 ARBORETUM BLVD	CITY/TOWNSHIP	VICTORIA
STATE	MN	COUNTY	CARVER
ZIP CODE	55386	PROJECT SIZE	8.0 ACRES
LATTITUDE/LONGITUDE OF APPROX. CENTROID OF PROJECT		44.85915 N, 93.67622 W	
METHOD OF LAT/LONG COLLECTION		ONLINE TOOL	
PROJECT TYPE		RESIDENTIAL AND ROAD CONSTRUCTION	
IMPERVIOUS SURFACES			
EXISTING		1.2 AC	
PROPOSED		3.3 AC	
DIFFERENCE		2.1 AC	
ESTIMATED CONSTRUCTION TIMELINE			
START	01/06/2024	END	01/09/2025
CONSTRUCTION ACTIVITY		SITE REDEVELOPMENT	
SOIL TYPES		SC, CL, SM, OL	

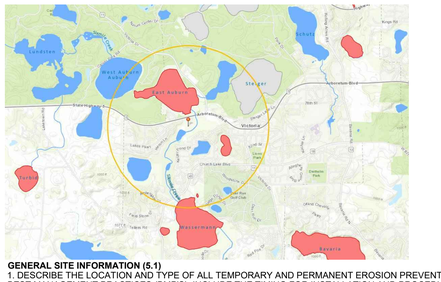
SOILS INFORMATION



MAP UNIT SYMBOL	MAP UNIT NAME
KC2	LESTER-KILKENNY COMPLEX, 6 TO 10 PERCENT SLOPES, MODERATELY ERODED
KD2	LESTER-KILKENNY COMPLEX, 10 TO 16 PERCENT SLOPES, MODERATELY ERODED
KE2	LESTER-KILKENNY COMPLEX, 16 TO 22 PERCENT SLOPES
MK	MUSKEGO AND HOUGHTON SOILS, 0 TO 1 PERCENT SLOPES
TB	TERRIL LOAM, 2 TO 6 PERCENT SLOPES

RECEIVING WATER BODIES					
	WATER BODY ID	NAME OF WATER BODY	WATER BODY TYPE	SPECIAL WATER (Y/N)	IMPAIRED WATER (Y/N)
1	10-0044-02	EAST AUBURN	LAKE	N	Y
2	10-0045-00	STEIGER	LAKE	N	Y
3	10-0046-00	CHURCH	LAKE	N	Y
4					

SITE LOCATION MAP -



GENERAL SITE INFORMATION (5.1)
1. DESCRIBE THE LOCATION AND TYPE OF ALL TEMPORARY AND PERMANENT EROSION PREVENTION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMP'S). INCLUDE THE TIMING FOR INSTALLATION AND PROCEDURES USED TO ESTABLISH ADDITIONAL TEMPORARY BMP'S AS NECESSARY. (5.5)
THE PROJECT IS PROTECTED BY TWO (W) MAIN BMP'S, SILT FENCE AND INLET PROTECTION DEVICES. THE SILT FENCE WILL BE INSTALLED AT THE DOWNHILL LOCATIONS OF THE SITE AND MONITORED AS NECESSARY. INLET PROTECTION DEVICES WILL BE INSTALLED IN ALL CATCH BASINS ON THE SITE AND ANY OFF SITE THAT WILL RECEIVE STORMWATER RUNOFF FROM THIS SITE. AS THE PROJECT PROGRESSES ADDITIONAL BMP'S SUCH AS EROSION CONTROL BLANKET MAY BE UTILIZED.
2. ATTACH TO THIS SWPPP A TABLE WITH THE ANTICIPATED QUANTITIES FOR THE LIFE OF THE PROJECT FOR ALL EROSION PREVENTION AND SEDIMENT CONTROL BMP'S (5.7). SEE PAGE SW1.3
3. ATTACH TO THIS SWPPP A SITE MAP THAT INCLUDES THE FOLLOWING FEATURES (5.9):
EXIST AND FINAL GRADES, INCLUDING DIVIDING LINES AND DIRECTION OF FLOW FOR ALL PRE AND POST-CONSTRUCTION STORMWATER RUNOFF DRAINAGE AREAS LOCATED WITHIN THE PROJECT LIMITS.

LOCATIONS OF IMPERVIOUS SURFACES AND SOIL TYPES.
- EXISTING AND FINAL GRADES, INCLUDING DIVIDING LINES AND DIRECTION OF FLOW FOR ALL PRE AND POST-CONSTRUCTION STORMWATER RUNOFF DRAINAGE AREAS LOCATED WITHIN PROJECT LIMITS.
- LOCATIONS OF AREAS NOT TO BE DISTURBED.
- LOCATION OF AREAS OF PHASED CONSTRUCTION.
- ALL SURFACE WATERS AND EXISTING WETLANDS WITHIN ONE MILE FROM THE PROJECT BOUNDARIES THAT WILL RECEIVE STORMWATER RUNOFF FROM THE SITE (IDENTIFIABLE ON MAPS SUCH AS USGS 7.5 MINUTE QUADRANGLE MAPS OR EQUIVALENT. WHERE SURFACE WATERS RECEIVING RUNOFF ASSOCIATED WITH CONSTRUCTION ACTIVITY WILL NOT FIT ON THE PLAN SHEET, THEY MUST BE IDENTIFIED WITH AN ARROW, INDICATING BOTH DIRECTION AND DISTANCE TO THE SURFACE WATER.
- METHODS TO BE USED FOR FINAL STABILIZATION OF ALL EXPOSED SOIL AREA

4. WERE STORMWATER MITIGATION MEASURES REQUIRED AS THE RESULT OF AN ENVIRONMENTAL, ARCHAEOLOGICAL, OR OTHER REQUIRED LOCAL, STATE OR FEDERAL REVIEW OF THE PROJECT? NO
IF YES, DESCRIBE HOW THESE MEASURES WERE ADDRESSED IN THE SWPPP. (5.16)
N/A

5. IS THE PROJECT LOCATED IN A KARST AREA SUCH THAT ADDITIONAL MEASURES WOULD BE NECESSARY TO PROJECT DRINKING WATER SUPPLY MANAGEMENT AREAS AS DESCRIBED IN MINN. R. CHAPTERS 7050 AND 7060? NO
IF YES, DESCRIBE THE ADDITIONAL MEASURES TO BE USED. (SECTION 23)
N/A
6. DOES THE SITE DISCHARGE TO A CALCEREOUS FEN LISTED IN MINN. R. 7050.0180, SUBP. 6.B? NO
IF YES, A LETTER OF APPROVAL FROM THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES MUST BE OBTAINED PRIOR TO APPLICATION FOR THIS PERMIT.
7. DOES THE SITE DISCHARGE TO A WATER THAT IS LISTED AS IMPAIRED FOR THE FOLLOWING POLLUTANT(S) OR STRESSOR(S): PHOSPHORUS, TURBIDITY, DISSOLVED OXYGEN OR BIOTIC IMPAIRMENT? USE THE SPECIAL AND IMPAIRED WATERS SEARCH TOOL AT: WWW.PCA.STATE.MN.US/WATER/STORMWATER/STORMWATER-C.HTML
YES
IF NO, SKIP TO TRAINING
DOES THE IMPAIRED WATER HAVE AN APPROVED TOTAL MAXIMUM DAILY LOADS (TMDL) WITH AN APPROVED WASTE LOAD ALLOCATION FOR CONSTRUCTION ACTIVITY? NO
IF YES:
A. LIST THE RECEIVING WATER, THE AREAS OF THE SITE DISCHARGING TO IT, AND THE POLLUTANT(S) IDENTIFIED IN THE TMDL.
B. LIST THE BMP'S AND ANY OTHER SPECIFIC CONSTRUCTION STORMWATER RELATED IMPLEMENTATION ACTIVITIES IDENTIFIED IN THE TMDL.

IF THE SITE HAS A DISCHARGE POINT WITHIN ONE MILE OF THE IMPAIRED WATER AND THE WATER FLOWS TO THE IMPAIRED WATER BUT NO SPECIFIC BMPS FOR CONSTRUCTION ARE IDENTIFIED IN THE TMDL, THE ADDITIONAL BMPS IN SECTION 23 MUST BE ADDED TO THE SWPPP AND IMPLEMENTED (15.19). THE ADDITIONAL BMPS ONLY APPLY TO THOSE PORTIONS OF THE PROJECT THAT DRAIN TO ONE OF THE IDENTIFIED DISCHARGE POINTS.

N/A

8. IDENTIFY ADJACENT PUBLIC WATERS WHERE THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES (DNR) HAS DECLARED "WORK IN WATER RESTRICTIONS" DURING FISH SPAWNING TIMEFRAMES
N/A

SELECTION OF A PERMANENT STORMWATER MANAGEMENT SYSTEM (SECTION 15)

1. WILL THE PROJECT CREATE A NEW CUMULATIVE IMPERVIOUS SURFACE GREATER THAN OR EQUAL TO ONE ACRE? YES

IF YES, A WATER QUALITY VOLUME OF ONE INCH OF RUNOFF FROM THE CUMULATIVE NEW IMPERVIOUS SURFACES MUST BE RETAINED ON SITE (SEE 16.7 OF THE PERMIT) THROUGH INFILTRATION UNLESS PROHIBITED DUE TO ONE OF THE REASONS IN ITEMS 16.4 THROUGH 16.21. IF INFILTRATION IS PROHIBITED IDENTIFY OTHER METHOD OF MEETING WATER QUALITY REQUIREMENTS (E.G., FILTRATION SYSTEM, WET SEDIMENTATION BASIN, REGIONAL PONDING OR EQUIVALENT METHOD

2. DESCRIBE WHICH METHOD WILL BE USED TO TREAT RUNOFF FROM THE NEW IMPERVIOUS SURFACES CREATED BY THE PROJECT:

INCLUDE ALL CALCULATIONS AND DESIGN INFORMATION FOR THE METHOD SELECTED. SEE SECTION 23 OF THE PERMIT FOR SPECIFIC REQUIREMENTS ASSOCIATED WITH EACH METHOD.

FILTRATION / REGIONAL PONDING

CALCULATIONS ARE WITHIN THE SITE STORM WATER MANAGEMENT REPORT AND PART OF THIS SWPPP AS ATTACHMENT D.

3. IF IT IS NOT FEASIBLE TO MEET THE TREATMENT REQUIREMENT FOR THE WATER QUALITY VOLUME, DESCRIBE WHY. THIS CAN INCLUDE PROXIMITY TO BEDROCK OR ROAD PROJECTS WHERE THE LACK OF RIGHT OF WAY PRECLUDES THE INSTALLATION OF ANY PERMANENT STORMWATER MANAGEMENT PRACTICES. DESCRIBE WHAT OTHER TREATMENT, SUCH AS GRASS SWALES, SMALLER PONDS, OR GRIT CHAMBERS, WILL BE IMPLEMENTED TO TREAT RUNOFF PRIOR TO DISCHARGE TO SURFACE WATERS. (15.8)

IT IS NOT FEASIBLE TO MEET REQUIREMENT FOR WATER QUALITY VOLUME.

4. FOR PROJECTS THAT DISCHARGE TO TROUT STREAMS, INCLUDING TRIBUTARIES TO TROUT STREAMS, IDENTIFY METHOD OF INCORPORATING TEMPERATURE CONTROLS INTO THE PERMANENT STORMWATER MANAGEMENT SYSTEM.

N/A

EROSION PREVENTION PRACTICES (SECTION 8.1)
DESCRIBE THE TYPES OF TEMPORARY EROSION PREVENTION BMP'S EXPECTED TO BE IMPLEMENTED ON THIS SITE DURING CONSTRUCTION:
1. DESCRIBE CONSTRUCTION PHASING, VEGETATIVE BUFFER STRIPS, HORIZONTAL SLOPE GRADING, AND OTHER CONSTRUCTION PRACTICES TO MINIMIZE EROSION. DELINEATE AREAS NOT TO BE DISTURBED (E.G., WITH FLAGS, STAKES, SIGNS, SILT FENCE, ETC.) BEFORE WORK BEGINS.
SILT FENCE WILL BE INSTALLED AT THE DOWNHILL LOCATIONS OF THE SITE.
2. DESCRIBE METHODS OF TEMPORARILY STABILIZING SOILS AND SOIL STOCKPILES (E.G., MULCHES, HYDRAULIC TACKIFIERS, EROSION BLANKETS, ETC.):
TEMPORARY EROSION PROTECTION WILL BE SEED AND MULCH AND EROSION BLANKETS WHERE REQUIRED, WITH PERMANENT COVER BEING EITHER SOD OR LANDSCAPE FEATURES.
3. DESCRIBE METHODS OF DISSIPATING VELOCITY ALONG STORMWATER CONVEYANCE CHANNELS AND AT CHANNEL OUTLETS (E.G., CHECK DAMS, SEDIMENT TRAPS, RIP RAP, ETC.):
SOD WILL BE UTILIZED ALONG CHANNELS AND RIP RAP AT CHANNEL.
4. DESCRIBE METHODS TO BE USED FOR STABILIZATION OF DITCH AND SWALE WETTED PERIMETERS (NOTE THAT MULCH, HYDRAULIC SOIL TACKIFIERS, HYDROMULCHES, ETC. ARE NOT ACCEPTABLE SOIL STABILIZATION METHODS FOR ANY PART OF A DRAINAGE DITCH OR SWALE)
FINAL STABILIZATION OF SWALES WILL BE SOD
5. DESCRIBE METHODS TO BE USED FOR ENERGY DISSIPATION AT PIPE OUTLETS (E.G., RIP RAP, SPLASH PADS, GABIONS, ETC.)
RIP RAP WILL BE UTILIZED AT PIPE OUTLETS
6. DESCRIBE METHODS TO BE USED TO PROMOTE INFILTRATION AND SEDIMENT REMOVAL ON THE SITE PRIOR TO OFFSITE DISCHARGE, UNLESS INFEASIBLE (E.G., DIRECT STORMWATER FLOW TO VEGETATED AREAS):
DISCONNECTED IMPERVIOUS AREA AND INFILTRATION AREAS WILL BE UTILIZED
7. FOR DRAINAGE OR DIVERSION DITCHES, DESCRIBE PRACTICES TO STABILIZE THE NORMAL WETTED PERIMETER WITHIN 200 LINEAL FEET OF THE PROPERTY EDGE OR POINT OF DISCHARGE TO SURFACE WATER. THE LAST 200 LINEAL FEET MUST BE STABILIZED WITHIN **24 HOURS** AFTER CONNECTING TO SURFACE WATERS AND CONSTRUCTION IN THAT PORTION OF THE DITCH HAS TEMPORARILY OR PERMANENTLY CEASED FOR ALL DISCHARGES TO SPECIAL, IMPAIRED OR "WORK IN WATER RESTRICTIONS". ALL OTHER REMAINING PORTIONS OF THE TEMPORARY OR PERMANENT DITCHES OR SWALES WITHIN 14 CALENDAR DAYS AFTER CONNECTING TO A SURFACE WATER, PROPERTY EDGE AND CONSTRUCTION IN THAT AREA HAS TEMPORARILY OR PERMANENTLY CEASED.
N/A, NO DITCHES ON SITE
8. DESCRIBE ADDITIONAL EROSION PREVENTION MEASURES THAT WILL BE IMPLEMENTED AT THE SITE DURING CONSTRUCTION (E.G., CONSTRUCTION PHASING, MINIMIZING SOIL DISTURBANCE, VEGETATIVE BUFFERS, HORIZONTAL SLOPE GRADING, SLOPE DRAINING/TERRACING, ETC.):
OTHER EROSION CONTROL PRACTICES INCLUDE BUT ARE NOT LIMITED TO; MINIMIZING SITE EXPOSURE WHEN POSSIBLE.
9. IF APPLICABLE, INCLUDE ADDITIONAL REQUIREMENTS IN APPENDIX A PART C.3 REGARDING MAINTAINING A 100-FOOT BUFFER ZONE OR INSTALLING REDUNDANT BMPS FOR PORTIONS OF THE SITE THAT DRAIN TO SPECIAL WATERS).
N/A
10. IF APPLICABLE, DESCRIBE ADDITIONAL EROSION PREVENTION BMPS TO BE IMPLEMENTED AT THE SITE TO PROTECT PLANNED FILTRATION AREAS
MINIMIZE SITE EXPOSURE IN AREAS ADJACENT TO FILTRATION AREAS.

SEDIMENT CONTROL PRACTICES (SECTION 9.1)
DESCRIBE THE METHODS OF SEDIMENT CONTROL BMPS TO BE IMPLEMENTED AT THIS SITE DURING CONSTRUCTION TO MINIMIZE SEDIMENT IMPACTS TO SURFACE WATERS, INCLUDING CURB AND GUTTER SYSTEMS
1. DESCRIBE METHODS TO BE USED FOR DOWN GRADIENT PERIMETER CONTROL:
SILT FENCE WILL BE INSTALLED AROUND THE ENTIRE PERIMETER OF THE SITE
2. DESCRIBE METHODS TO BE USED TO CONTAIN SOIL STOCKPILES:
SEED AND MULCH AS WELL AS EROSION CONTROL BLANKETS WILL BE UTILIZED AS NECESSARY
3. DESCRIBE METHODS TO BE USED FOR STORM DRAIN INLET PROTECTION:
SEE INLET PROTECTION DETAILS
4. DESCRIBE METHODS TO MINIMIZE VEHICLE TRACKING AT CONSTRUCTION EXITS AND STREET SWEEPING ACTIVITIES:
THE PROJECT WILL UTILIZE A ROCK CONSTRUCTION ENTRANCE.
5. DESCRIBE METHODS, IF APPLICABLE, ADDITIONAL SEDIMENT CONTROLS (E.G., DIVERSION BERMS) TO BE INSTALLED TO KEEP RUNOFF AWAY FROM PLANNED INFILTRATION AREAS WHEN EXCAVATED PRIOR TO FINAL STABILIZATION OF THE CONTRIBUTING DRAINAGE AREA:
SILT FENCE TO BE INSTALLED IMMEDIATELY AFTER GRADING TO PROTECT INFILTRATION AREAS.
6. DESCRIBE METHODS TO BE USED TO MINIMIZE SOIL COMPACTION AND PRESERVE TOP SOIL (UNLESS INFEASIBLE) AT THIS SITE:
LIGHT TRACKED EQUIPMENT WILL BE USED, TOPSOIL WILL BE STRIPPED AND STOCKPILED
7. DESCRIBE PLANS TO PRESERVE A 50-FOOT NATURAL BUFFER BETWEEN THE PROJECT'S SOIL DISTURBANCE AND A SURFACE WATER OR PLANS FOR REDUNDANT SEDIMENT CONTROLS IF A BUFFER IS INFEASIBLE:
DOUBLE ROW OF SILT FENCE WILL BE INSTALLED ALONG WETLAND. PROJECT WILL NOT DISTURB WITHIN 200 FEET OF WETLAND.
8. DESCRIBE PLANS FOR USE OF SEDIMENTATION TREATMENT CHEMICALS (E.G., POLYMERS, FLOCCULANTS, ETC.) SEE PART 9.18 OF THE PERMIT:
N/A
9. IS THE PROJECT REQUIRED TO INSTALL A TEMPORARY SEDIMENT BASIN DUE TO 10 OR MORE ACRES DRAINING TO A COMMON LOCATION OR 5 ACRES OR MORE IF THE SITE IS WITHIN 1 MILE OF A SPECIAL OR IMPAIRED WATER?
NO
IF YES, DESCRIBE (OR ATTACH PLANS) SHOWING HOW THE BASIN WILL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH SECTION 14.
PROPOSED FILTRATION BASINS WILL SERVE AS TEMPORARY SEDIMENTS BASINS THAT WILL THEN BE CONVERTED TO PERMANENT FILTRATIONS BASINS.

DEWATERING AND BASIN DRAINING (SECTION 10.1)

1. WILL THE PROJECT INCLUDE DEWATERING OR BASIN DRAINING? NO

IF YES, DESCRIBE MEASURES TO BE USED TO TREAT/DISPOSE OF TURBID OR SEDIMENT-LADEN WATER AND METHOD TO PREVENT EROSION OR SCOUR OF DISCHARGE POINTS (SEE 10.2 THROUGH 10.4 OF THE PERMIT):
N/A

2. WILL THE PROJECT INCLUDE USE OF FILTERS FOR BACKWASH WATER? NO
IF YES, DESCRIBE HOW FILTER BACKWASH WATER WILL BE MANAGED ON THE SITE OR PROPERLY DISPOSED (10.5):
N/A

ADDITIONAL BMP'S FOR SPECIAL WATERS AND DISCHARGES TO WETLANDS (SECTION 23.1)
1. SPECIAL WATERS. DOES YOUR PROJECT DISCHARGE TO SPECIAL WATERS? NO
2. IF PROXIMITY TO BEDROCK OR ROAD PROJECTS WHERE THE LACK OF RIGHT OF WAY PRECLUDES THE INSTALLATION OF ANY OF THE PERMANENT STORMWATER MANAGEMENT PRACTICES, THEN OTHER TREATMENT SUCH AS GRASSED SWALES, SMALLER PONDS, OR GRIT CHAMBERS IS REQUIRED PRIOR TO DISCHARGE TO SURFACE WATERS. DESCRIBE WHAT OTHER TREATMENT WILL BE PROVIDED.
N/A
3. DESCRIBE EROSION AND SEDIMENT CONTROLS FOR EXPOSED SOIL AREAS WITH A CONTINUOUS POSITIVE SLOPE TO A SPECIAL WATERS, AND TEMPORARY SEDIMENT BASINS FOR AREAS THAT DRAIN FIVE OR MORE ACRES DISTURBED AT ONE TIME.
N/A
4. DESCRIBE THE UNDISTURBED BUFFER ZONE TO BE USED (NOT LESS THAN 100 LINEAR FEET FROM THE SPECIAL WATER).
N/A
5. DESCRIBE HOW THE PERMANENT STORMWATER MANAGEMENT SYSTEM WILL ENSURE THAT THE PRE AND POST PROJECT RUNOFF RATE AND VOLUME FROM THE 1, AND 2-YEAR 24-HOUR PRECIPITATION EVENTS REMAINS THE SAME.
N/A
6. DESCRIBE HOW THE PERMANENT STORMWATER MANAGEMENT SYSTEM WILL MINIMIZE ANY INCREASE IN THE TEMPERATURE OF TROUT STREAM RECEIVING WATERS RESULTING IN THE 1, AND 2-YEAR 24-HOUR PRECIPITATION EVENTS.
N/A
7. **WETLANDS.** DOES YOUR PROJECT DISCHARGE STORMWATER WITH THE POTENTIAL FOR SIGNIFICANT ADVERSE IMPACTS TO A WETLAND (E.G., CONVERSION OF A NATURAL WETLAND TO A STORMWATER POND)? NO
IF YES, DESCRIBE THE WETLAND MITIGATION SEQUENCE THAT WILL BE FOLLOWED IN ACCORDANCE WITH SECTION 22 OF THE PERMIT.
N/A

INSPECTIONS AND MAINTENANCE (SECTION 11.1)
DESCRIBE PROCEDURES TO ROUTINELY INSPECT THE CONSTRUCTION SITE:
- ONCE EVERY SEVEN (7) DAYS DURING ACTIVE CONSTRUCTION AND
- WITHIN 24 HOURS AFTER A RAINFALL EVENT GREATER THAN 0.5 INCHES IN 24 HOURS, AND WITHIN (7) DAYS AFTER THAT

INSPECTIONS MUST INCLUDE STABILIZED AREAS, EROSION PREVENTION,AND SEDIMENT CONTROL BMP'S AND INFILTRATION AREAS.
INSPECTOR WILL FOLLOW REQUIREMENTS SPECIFIED ABOVE AND FILL OUT "ATTACHMENT B - CONSTRUCTION STORMWATER INSPECTION CHECKLIST"
1. DESCRIBE PRACTICES FOR STORAGE OF BUILDING PRODUCTS WITH A POTENTIAL TO LEACH POLLUTANTS TO MINIMIZE EXPOSURE TO STORMWATER:
ALL BUILDING PRODUCTS WILL BE SEALED AND STORED IN A MANNER TO MINIMIZE EXPOSURE
2. DESCRIBE PRACTICES FOR STORAGE OF PESTICIDES, HERBICIDES, INSECTICIDES, FERTILIZERS, TREATMENT CHEMICAL, AND LANDSCAPE MATERIALS:
ALL LANDSCAPE TREATMENT CHEMICALS WILL BE SEALED AND STORED IN A MANNER TO MINIMIZED EXPOSURE
3. DESCRIBE PRACTICES FOR STORAGE AND DISPOSAL OF HAZARDOUS MATERIALS OR TOXIC WASTE (E.G., OIL, FUEL, HYDRAULIC FLUIDS, PAINT SOLVENTS, PETROLEUM-BASED PRODUCTS, WOOD PRESERVATIVE, ADDITIVES, CURING COMPOUNDS, AND ACIDS) ACCORDING TO MINN. R. CH. 7045, INCLUDING RESTRICTED ACCESS AND SECONDARY CONTAINMENT:
ALL HAZARDOUS WASTE WILL BE APPROPRIATELY DISPOSED OF OFF SITE ACCORDING TO LOCAL AND STATE LAWS.
4. DESCRIBE COLLECTION, STORAGE AND DISPOSAL OF SOLID WASTE IN COMPLIANCE WITH MINN. R. CH. 7035:
ALL CONSTRUCTION DEBRIS AND SOLID WASTER WILL BE APPROPRIATELY DISPOSED OF OFF SITE ACCORDING TO LOCAL AND STATE LAWS
5. DESCRIBE MANAGEMENT OF PORTABLE TOILETS TO PREVENT TIPPING AND DISPOSAL OF SANITARY WASTES IN ACCORDANCE WITH MINN. R. CH. 7040:
SANITARY AND SEPTIC SERVICES WILL BE PROVIDED TO WORKERS WITH PORTABLE FACILITIES MAINTAINED AS NEEDED BY THE PROVIDER.
6. DESCRIBE SPILL PREVENTION AND RESPONSE FOR FUELING AND EQUIPMENT OR VEHICLE MAINTENANCE:
EMPLOYEES WILL BE TRAINED IN TECHNIQUES DESIGNED TO MINIMIZE SPILLS. VEHICLES AND EQUIPMENT SHALL BE CHECKED FOR LEAKS.
7. DESCRIBE CONTAINMENT AND DISPOSAL OF VEHICLE AND EQUIPMENT WASH WATER AND PROHIBITING ENGINE DEGREASING ON THE SITE:
ALL CONSTRUCTION VEHICLES SHALL BE WASHED OFF SITE
8. DESCRIBE STORAGE AND DISPOSAL OF CONCRETE AND OTHER WASHOUT WASTES SO THAT WASTES DO NOT CONTACT THE GROUND:
ALL CONCRETE WASHOUT SHALL OCCUR OFF SITE.

FINAL STABILIZATION (25.22)
1. DESCRIBE METHOD OF FINAL STABILIZATION (PERMANENT COVER) OF ALL DISTURBED AREAS:
FINAL STABILIZATION WILL BE ACCOMPLISHED WITH PAVEMENT, SOD AND LANDSCAPE MATERIALS.
2. DESCRIBE METHODS USED TO CLEAN ALL STORMWATER TREATMENT SYSTEMS AND STORMWATER CONVEYANCE SYSTEMS OF ACCUMULATED SEDIMENT (25.22):
CLEANING OF STORMWATER TREATMENT SYSTEMS SHALL BE DONE BY HAND SUCH AS THE USE OF A SHOVEL.
3. DESCRIBE METHODS FOR REMOVING ALL TEMPORARY SYNTHETIC EROSION PREVENTION AND SEDIMENT CONTROL BMP'S
REMOVAL OF TEMPORARY SYNTHETIC EROSION PREVENTION AND SEDIMENT CONTROL BMP'S CAN BE DONE BY HAND AND PROPERLY DISPOSED OF.

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

SWPPP - ATTACHMENTS

SW1.4

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

ATTACHMENT B: SWPPP INSPECTION FORM

NOTE: THIS INSPECTION REPORT DOES NOT ADDRESS ALL ASPECTS OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM/STATE DISPOSAL SYSTEM (NPDES/SDS) CONSTRUCTION STORMWATER PERMIT (PERMIT) ISSUED ON AUGUST 1, 2018. THE COMPLETION OF THIS CHECKLIST DOES NOT GUARANTEE THAT ALL PERMIT REQUIREMENTS ARE IN COMPLIANCE; IT IS THE RESPONSIBILITY OF THE PERMITTEE(S) TO READ AND UNDERSTAND THE PERMIT REQUIREMENTS.

FACILITY INFORMATION
SITE NAME:
SITE ADDRESS: PERMIT NUMBER:
CITY: STATE: ZIP CODE:

INSPECTION INFORMATION
INSPECTOR NAME: _____ PHONE NUMBER: _____
ORGANIZATION/COMPANY MAN: _____
DATE (MM/DD/YYYY): _____ TIME: _____ AM / PM

	Y	N
IS THE INSPECTOR CERTIFIED IN SEDIMENT AND EROSION CONTROL AND IS IT DOCUMENTED IN THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP)?	☐	☐

IS THIS INSPECTION ROUTINE OR IN RESPONSE TO A STORM EVENT:

7 DAY	RAIN
☐	☐

	Y	N
RAINFALL AMOUNT (IF APPLICABLE): _____		
IS SITE WITHIN ONE AERIAL MILE OF SPECIAL OR IMPAIRED WATER THAT CAN POTENTIALLY RECEIVE DISCHARGE FROM THE SITE?	☐	☐

IF YES, FOLLOW SECTION 23 AND OTHER APPLICABLE PERMIT REQUIREMENTS

NOTE: IF N/A IS SELECTED AT ANY TIME, SPECIFY WHY IN THE COMMENT AREA FOR THAT SECTION.

EROSION CONTROL REQUIREMENT (SECTION 8.1)

	Y	N	N/A
1. ARE SOILS STABILIZED WHERE NO CONSTRUCTION ACTIVITY HAS OCCURRED FOR 14 DAYS (INCLUDING STOCKPILES)? (7 DAYS WHERE APPLICABLE, OR 24 HOURS DURING MINNESOTA DEPARTMENT OF NATURAL RESOURCES [DNR] FISH SPAWNING RESTRICTIONS)	☐	☐	☐
2. HAS THE NEED TO DISTURB STEEP SLOPES BEEN MINIMIZED?	☐	☐	☐
3. IF STEEP SLOPES ARE DISTURBED, ARE STABILIZATION PRACTICES DESIGNED FOR STEEP SLOPES USED?	☐	☐	☐
4. ALL DITCHES/SWALES STABILIZED 200' BACK FROM POINT OF DISCHARGE OR PROPERTY EDGE WITHIN 24 HOURS? (MULCH, HYDROMULCH, TACKIFIER, OR SIMILAR BEST MANAGEMENT PRACTICES [BMPS] ARE NOT ACCEPTABLE IN DITCHES/SWALES IF THE SLOPE IS GREATER THAN 2%)ARE APPROPRIATE BMP'S INSTALLED PROTECTING INLETS/OUTLETS?	☐	☐	☐
5. DO PIPE OUTLETS HAVE ENERGY DISSIPATION (WITHIN 24 HOURS OF CONNECTION)?	☐	☐	☐
6. IS CONSTRUCTION PHASING BEING FOLLOWED IN ACCORDANCE WITH THE SWPPP?	☐	☐	☐
7. ARE AREAS NOT TO BE DISTURBED MARKED OFF (FLAGS, SIGNS, ETC.)?	☐	☐	☐

COMMENTS:

SEDIMENT CONTROL REQUIREMENTS (SECTION 9.1)

	Y	N	N/A
1. ARE PERIMETER SEDIMENT CONTROLS INSTALLED PROPERLY ON ALL DOWN GRADIENT PERIMETERS?	☐	☐	☐
2. ARE APPROPRIATE BMPS INSTALLED PROTECTING INLETS, CATCH BASINS, AND CULVERT INLETS?	☐	☐	☐
3. IS A 50 FOOT NATURAL BUFFER PRESERVED AROUND ALL SURFACE WATERS DURING CONSTRUCTION?	☐	☐	☐
3.1. IF NO, HAVE REDUNDANT SEDIMENT CONTROLS BEEN INSTALLED?	☐	☐	☐
4. DO ALL ERODIBLE STOCKPILES HAVE PERIMETER CONTROL IN PLACE?	☐	☐	☐
5. IS THERE A TEMPORARY SEDIMENT BASIN ON SITE, AND IS IT BUILT AS REQUIRED IN SECTION 14 OF THE PERMIT?	☐	☐	☐
6. IS SOIL COMPACTION BEING MINIMIZED WHERE NOT DESIGNED FOR COMPACTION?	☐	☐	☐
7. IS TOPSOIL BEING PRESERVED UNLESS INFEASIBLE?	☐	☐	☐
8. IF CHEMICAL FLOCCULANTS ARE USED, IS THERE A CHEMICAL FLOCCULANT PLAN IN PLACE?	☐	☐	☐

COMMENTS:

MAINTENANCE AND INSPECTIONS (SECTION 11)

	Y	N	N/A
1. ARE ALL PREVIOUSLY STABILIZED AREAS MAINTAINING GROUND COVER?	☐	☐	☐
2. ARE PERIMETER CONTROLS MAINTAINED AND FUNCTIONING PROPERLY, SEDIMENT REMOVED WHEN ONE-HALF FULL?	☐	☐	☐
3. ARE INLET PROTECTION DEVICES MAINTAINED AND ADEQUATELY PROTECTING INLETS?	☐	☐	☐
4. ARE THE TEMPORARY SEDIMENT BASINS BEING MAINTAINED AND FUNCTIONING PROPERLY?	☐	☐	☐
5. ARE VEHICLE TRACKING BMPS AT SITE EXISTS IN PLACE AND MAINTAINED AND FUNCTIONING PROPERLY?	☐	☐	☐
6. IS ALL TRACKED SEDIMENT BEING REMOVED WITHIN 24 HOURS?	☐	☐	☐
7. HAVE ALL SURFACE WATERS, DITCHES, CONVEYANCES, AND DISCHARGE POINTS BEEN INSPECTED?	☐	☐	☐
8. WERE ANY DISCHARGES SEEN DURING THIS INSPECTION (I.E., SEDIMENT, TURBID WATER, OR OTHERWISE)?	☐	☐	☐

IF YES, RECORD THE LOCATION OF ALL POINTS OF DISCHARGE. PHOTOGRAPH AND DESCRIBE THE DISCHARGE (SIZE, COLOR, ODOR, FOAM, OIL SHEEN, TIME, ETC.). DESCRIBE HOW THE DISCHARGE WILL BE ADDRESSED. WAS THE DISCHARGE A SEDIMENT DELTA? IF YES, WILL THE DELTA BE RECOVERED WITHIN SEVEN DAYS AND IN ACCORDANCE WITH ITEM 11.5 OF THE PERMIT?

COMMENTS:

POLLUTION PREVENTION (SECTION 12)

	Y	N	N/A
1. ARE ALL CONSTRUCTION MATERIALS THAT CAN LEACH POLLUTANTS UNDER COVER OR PROTECTED?	☐	☐	☐
2. ARE HAZARDOUS MATERIALS BEING PROPERLY STORED?	☐	☐	☐
3. ARE APPROPRIATE BMPS BEING USED TO PREVENT DISCHARGES ASSOCIATED WITH FUELING AND MAINTENANCE OF	☐	☐	☐
EQUIPMENT OR VEHICLES?	☐	☐	☐
4. ARE ALL SOLID WASTES BEING PROPERLY CONTAINED AND DISPOSED OF?	☐	☐	☐
5. IS THERE A CONCRETE/OTHER MATERIAL WASHOUT AREA ON SITE AND IS IT BEING USED?	☐	☐	☐
6. IS THE CONCRETE WASHOUT AREA MARKED WITH A SIGN?	☐	☐	☐
7. ARE THE CONCRETE/OTHER MATERIAL WASHOUT AREAS PROPERLY MAINTAINED?	☐	☐	☐

COMMENTS:

OTHER

	Y	N	N/A
1. IS A COPY OF THE SWPPP, INSPECTION RECORDS, AND TRAINING DOCUMENTATION LOCATED ON THE CONSTRUCTION	☐	☐	☐
SITE, OR CAN IT BE MADE AVAILABLE WITHIN 72 HOURS?	☐	☐	☐
2. HAS THE SWPPP BEEN FOLLOWED AND IMPLEMENTED ON SITE, AND AMENDED AS NEEDED?	☐	☐	☐
3. IS ANY DEWATERING OCCURRING ON SITE?	☐	☐	☐
IF YES, WHAT BMPS ARE BEING USED TO ENSURE THAT CLEAN WATER IS LEAVING THE SITE AND THE DISCHARGE IS NOT CAUSING EROSION OR SCOUR?	☐	☐	☐
4. WILL A PERMANENT STORMWATER MANAGEMENT SYSTEM BE CREATED FOR THIS PROJECT IF REQUIRED AND IN ACCORDANCE WITH SECTION 15 OF THE PERMIT (IF ADDING AN ACRE OR MORE OF NEW IMPERVIOUS SURFACE)? IF YES, DESCRIBE:	☐	☐	☐
5. IF INFILTRATION/FILTRATION SYSTEMS ARE BEING CONSTRUCTED, ARE THEY MARKED AND PROTECTED FROM COMPACTION AND SEDIMENTATION?	☐	☐	☐

6. DESCRIPTION OF AREAS OF NON-COMPLIANCE NOTED DURING THE INSPECTION, REQUIRED CORRECTIVE ACTIONS, AND RECOMMENDED DATE OF COMPLETION OF CORRECTIVE ACTIONS:

7. PROPOSED AMENDMENTS TO THE SWPPP:

8. POTENTIAL AREAS OF FUTURE CONCERN:

9. ADDITIONAL COMMENTS

DISCLOSURES:

- AFTER DISCOVERY, THE PERMIT REQUIRES MANY OF THE DEFICIENCIES THAT MAY BE FOUND ON SITE BE CORRECTED WITHIN A SPECIFIED PERIOD OF TIME. SEE PERMIT FOR MORE DETAILS.
- THE PERMITTEE(S) IS/ARE RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE OF TEMPORARY AND PERMANENT WATER QUALITY MANAGEMENT BMPS AS WELL AS EROSION PREVENTION AND SEDIMENT CONTROL BMPS UNTIL ANOTHER PERMITTEE HAS OBTAINED COVERAGE UNDER THIS PERMIT ACCORDING TO SECTION 3, OR THE PROJECT HAS MET THE TERMINATION CONDITIONS OF THE PERMIT AND A NOTICE OF TERMINATION HAS BEEN SUBMITTED TO THE MINNESOTA POLLUTION CONTROL AGENCY.

ATTACHMENT C: MAINTENANCE PLAN FOR PERMANENT STORM WATER TREATMENT SYSTEM

ATTACHMENT C - COMBINED
FACILITY MANAGEMENT SCHEDULE

1. ALL STORMWATER RETENTION, DETENTION AND TREATMENT BASINS MUST BE INSPECTED AT LEAST ONCE A YEAR TO DETERMINE THAT BASIN RETENTION AND TREATMENT CHARACTERISTICS ARE ADEQUATE. A STORAGE TREATMENT BASIN WILL BE CONSIDERED INADEQUATE IF SEDIMENT HAS DECREASED THE WET STORAGE VOLUME BY 50 PERCENT OR DRY STORAGE VOLUME BY 25 PERCENT OF ITS ORIGINAL DESIGN VOLUME. BASED ON THIS INSPECTION, IF A STORMWATER BASIN REQUIRES SEDIMENT CLEANOUT, THE BASIN WILL BE RESTORED TO ITS ORIGINAL DESIGN CONTOURS AND VEGETATED STATE WITHIN ONE YEAR OF THE INSPECTION DATE.
2. ALL GRIT CHAMBERS, SUMP CATCH BASINS, SUMP MANHOLES, OUTLET STRUCTURES, CULVERTS, OUTFALL STRUCTURES AND OTHER STORMWATER FACILITIES FOR WHICH MAINTENANCE REQUIREMENTS ARE NOT OTHERWISE SPECIFIED HEREIN MUST BE INSPECTED IN THE SPRING, SUMMER AND FALL OF EACH YEAR. WITHIN 30 DAYS OF THE INSPECTION DATE, ALL ACCUMULATED SEDIMENT AND DEBRIS MUST BE REMOVED SUCH THAT EACH STORMWATER FACILITY OPERATES AS DESIGNED AND PERMITTED. CONTRIBUTING DRAINAGE AREAS MUST BE KEPT CLEAR OF LITTER AND VEGETATIVE DEBRIS, INFLOW PIPES AND OVERFLOW SPILLWAYS KEPT CLEAR, INLET AREAS KEPT CLEAN, AND UNDESIRABLE VEGETATION REMOVED. EROSION IMPAIRING THE FUNCTION OR INTEGRITY OF THE FACILITIES, IF ANY, WILL BE CORRECTED, AND ANY STRUCTURAL DAMAGE IMPAIRING OR THREATENING TO IMPAIR THE FUNCTION OF THE FACILITIES MUST BE REPAIRED.
3. VOLUME CONTROL FACILITIES AND CONTRIBUTING DRAINAGE AREAS MUST BE INSPECTED EVERY THREE MONTHS DURING THE OPERATIONAL PERIOD (BETWEEN SPRING SNOWMELT AND FIRST SUBSTANTIAL SNOWFALL) AND MONITORED AFTER RAINFALL EVENTS OF 1 INCH OR MORE TO ENSURE THAT THE CONTRIBUTING DRAINAGE AREA IS CLEAR OF LITTER AND DEBRIS, INFLOW PIPES AND OVERFLOW SPILLWAYS ARE CLEAR, INLET AREAS ARE CLEAN, UNDESIRABLE VEGETATION IS REMOVED AND THERE IS NO EROSION IMPAIRING OR THREATENING TO IMPAIR THE FUNCTION OF A FACILITY. IF SEDIMENT HAS ACCUMULATED IN A INFILTRATION FEATURE, WITHIN 30 DAYS OF INSPECTION DEPOSITED SEDIMENTS MUST BE REMOVED, THE INFILTRATION CAPACITY OF THE UNDERLYING SOILS MUST BE RESTORED, AND ANY SURFACE DISTURBANCE MUST BE STABILIZED. INSPECTION MUST ENSURE THAT SEDIMENT TRAPS AND FOREBAYS ARE TRAPPING SEDIMENT AND THAT MORE THAN 50 PERCENT OF THE STORAGE VOLUME REMAINS, THE CONTRIBUTING DRAINAGE AREA IS STABLE (I.E., NO EROSION IS OBSERVED), AND INLETS AND OUTLET/OVERFLOW SPILLWAYS ARE IN GOOD CONDITIONS WITH NO EROSION. MAINTENANCE TECHNIQUES USED MUST PROTECT THE INFILTRATION CAPACITY OF THE PRACTICE BY LIMITING SOIL COMPACTION TO THE GREATEST EXTENT POSSIBLE (E.G., BY USING LOW-IMPACT EARTH-MOVING EQUIPMENT).
4. UNDERGROUND STORAGE CHAMBERS MUST BE INSPECTED AT LEAST ONCE A YEAR TO ENSURE THAT ADEQUATE STORAGE CAPACITY REMAINS. CAPACITY WILL BE CONSIDERED INADEQUATE IF SEDIMENT HAS DECREASED THE STORAGE VOLUME BY 50 PERCENT OF ITS ORIGINAL DESIGN VOLUME. ACCUMULATED DEBRIS AND SEDIMENT WILL BE REMOVED, AND INLET AND OUTLET STRUCTURES WILL BE CLEARED OF ANY FLOW IMPEDIMENTS.

CivilSite GROUP
Civil Engineering • Surveying • Landscape Architecture
5000 Glenwood Avenue
Golden Valley, MN 55422
civilsitegroup.com 612-615-0060

PRELIMINARY: NOT FOR CONSTRUCTION

PROJECT
AMIRA VICTORIA
2285 ARBORETUM BOULEVARD, VICTORIA, MN 55386

UNITED PROPERTIES
250 NICOLLET MALL, SUITE 500, MINNEAPOLIS, MN 55401

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
05/19/2023	CITY SUBMITTAL
6/29/2023	WATERSHED RESUBMITTAL

DRAWN BY	BB, BN
REVIEWED BY	DK
PROJECT MANAGER	DK
PROJECT NUMBER	22500

REVISION SUMMARY

DATE	DESCRIPTION

SWPPP - ATTACHMENTS

SW1.5

© COPYRIGHT 2023 CIVIL SITE GROUP INC.

Stormwater Management Report

Owner:
United Properties
250 Nicollet Mall, Suite #500
Minneapolis, MN 55401

Project:
Amira Victoria
2285 Arboretum Boulevard
Victoria, MN 55386

Engineer's Certification:

All plans and supporting Documentation contained in this report have been reviewed by me and it is hereby certified that to the best of my knowledge the plans comply with the requirements of the ordinance.

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

David J. Knaeble

David J. Knaeble P.E.

Registration Number: 48776

Date:
5/18/23
REV.: 6/29/23
REV.: 7/7/23

Table of Contents:

1.0 Cover Sheet, Engineer's Certification
2.0 Summary Analysis / Narrative
- 2.1 Introduction
- 2.2 Existing Site Conditions
- 2.3 Proposed Site Conditions
- 2.4 Stormwater Requirements – City
- 2.5 Stormwater Requirements – Watershed District
- 2.6 Stormwater Requirements – MPCA / NPDES

3.0 Stormwater Calculations
- 3.1 Proposed Stormwater Management Strategy & Facilities Description
- 3.2 Rate Control
- 3.3 Water Quality
- 3.4 Volume Control
- 3.5 Enhanced Stormwater Management for Buffer Exception

4.0 Conclusions

Figures:

Figure 1 – Drainage Calculations Summary Table
Figure 2 – Existing Conditions Drainage Area Map
Figure 3 – Proposed Conditions Drainage Area Map

Appendices:

- HydroCAD
  - Existing Conditions HydroCAD Modeling
  - Proposed Conditions HydroCAD Modeling
- MIDS Calculator Results
- Contech Storm Filter with Phosphosorb MN Stormwater Manual Data
- Storm Sewer Sizing [TO BE PROVIDED AT A FUTURE DATE]
  - Storm Sewer Sizing Map
  - Storm Sewer Sizing Spreadsheet
- Geotechnical Report (On File at the Office of the Engineer)

2.0 Summary Analysis / Narrative:

2.1 Introduction:

This stormwater management report accompanies the Civil Engineering Plans prepared by Civil Site Group for the subject project dated 6/29/23. This report includes a summary of the existing and proposed site conditions, the stormwater requirements of relevant regulatory agencies, and proposed design calculations and data to meet the requirements.

2.2 Existing Site Conditions :

Site Description:
The existing site consists of two single family homes on a large parcel. The site is bounded by Highway 5 to the north and an existing wetland to the south.

Existing Conditions

Drainage Area	Impervious Area		Pervious Area		Total Area	
	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value
EX1	15441	98	337713	80	353154	81
EX2A	61	98	7808	80	7869	80
EX2B	0	98	5531	80	5531	80

Existing Soils:
A Geotechnical Evaluation Report was completed by Braun Intertec, dated December 22, 2022. This report determined the soils on site are a mix clayey sands and clay (SC-CL). For the purposes of this report, soils have been assumed to have a hydrologic soil group “D” designation.

Groundwater:
Groundwater was not observed in any of the borings, but the existing wetland is at an approximate elevation of 943-944.

2.3 Proposed Site Conditions:

Site Description:
The proposed site is the subdivision of the property into two single family lots and a multi-family residential building with associated parking, landscaping, utility and stormwater improvements.

The proposed site surface coverage areas are shown in the table below:

Proposed Conditions

Drainage Area	Impervious Area		Impervious Area - Exempt		Pervious Area		Total Area	
	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value
PR1A	118617	98	2539	98	30701	80	151857	94
PR1B	9266	98	738	98	2949	80	12953	94
PR1C	8162	98	9156	98	171161	80	188479	82
PR2	0	98	0	98	13188	80	13188	80

Site Area Summary

	Impervious [SF]	Impervious [AC]	Impervious [SF] - EX	Impervious [AC] - EX	Pervious [SF]	Pervious [AC]	Total [SF]	Total [AC]
Existing Site	15502	0.36	--	--	351052	8.06	366554	8.41
Proposed Site	136045	3.12	12433	0.29	217999	5.00	366477	8.41

2.4 Stormwater Requirements City (Victoria):

Requirement threshold – Refer to Watershed.
Rate Control – Refer to Watershed.
Water Quality – Refer to Watershed.
Volume Control – Refer to Watershed.

2.5 Stormwater Requirements Watershed District – (Minnehaha Creek Watershed District):

Requirement threshold – New development sites larger than one acre and that will result in more than 20% impervious surface over the site.
Rate Control – No net increase in the peak runoff rate for the 1-, 10- and 100-year design storms where stormwater discharges across the downgradient site boundary, compared to the rate for the site in its existing condition.
Water Quality – No net increase in phosphorus loading from existing conditions.
Volume Control – Abstraction of the first inch of rainfall from the site's impervious surface.

2.6 Stormwater Requirements - Minnesota Pollution Control Agency – NPPDES permit (MPCA):

Requirement threshold - A permit is required for projects with a disturbed area over 1 acre in size, Stormwater management is required for a project adding 1-acre of more of NEW impervious surface (reconstructed impervious is not included).
Rate Control – No specific regulation, may not degrade downstream facilities.
Water Quality – Stormwater water quality treatment volume must be provided equal to 1.0" over all new impervious surfaces (includes all newly constructed impervious surfaces only, re-constructed impervious surfaces are not included).
Volume Control – Must consider volume reduction if feasible and not prohibited on site. The required infiltration volume is equal to the water quality volume described above.

3.0 Stormwater Calculations:

3.1 Proposed Stormwater Management Strategy & Facilities Description

This project is disturbing approximately 8.0 acres of land. The project will be constructing 3.5 acres of new/reconstructed impervious surfaces. This land disturbance and creation of impervious surfaces will trigger stormwater management requirements from the Minnehaha Creek Watershed District, the City of Victoria and the MPCA NPDES Permit.

This project is proposing to use underground detention device with a proprietary filter and an aboveground filtration basin to meet the abstraction requirement of the regulating authorities and the MCWD. Per Appendix A: MCWD Volume Abstraction Credit Schedule, filtration credit is equal to one half of the volume below the overflow elevation. Filtration is proposed to be used due to the poor infiltrating soils present.

3.2 Rate Control

Rate control is provided by live storage within the underground and aboveground systems. The basins control the peak site discharge rates to below the existing 1-year, 10-year, and 100-year peak discharge rates. This information was derived using HydroCAD stormwater modeling software. The existing and proposed runoff rates are shown in the summary table below.

Stormwater Rate Summary

Drainage Area	Existing Rate (cfs)			
	1-YR [2.49"]	2-YR [2.85"]	10-YR [4.22"]	100-YR [7.25"]
EX1	9.91	12.82	24.85	53.39
EX2A	0.25	0.32	0.63	1.36
EX2B	0.17	0.22	0.44	0.95
TOTAL	10.33	13.36	25.92	55.70

Drainage Area	Proposed Conditions Rate (cfs)			
	1-YR [2.49"]	2-YR [2.85"]	10-YR [4.22"]	100-YR [7.25"]
1P (PR1A)	0.34	0.34	2.15	14.56
2P (PR1B)	0.06	0.06	0.11	1.86
PR1C	6.54	8.34	15.74	33.18
PR2	0.41	0.53	1.05	2.27
TOTAL (REACH)	7.35	9.27	19.05	51.87

Overall Stormwater Rate Summary

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
1-Year Event	10.33	7.35
2-Year Event	13.36	9.27
10-Year Event	25.92	19.05
100-Year Event	55.70	51.87

Stormwater Rate Summary - To Wetland [South]

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
1-Year Event	9.91	6.94
2-Year Event	12.82	8.74
10-Year Event	24.85	18.00
100-Year Event	53.39	49.60

Stormwater Rate Summary - To Highway 5 [North]

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
1-Year Event	0.42	0.41
2-Year Event	0.54	0.53
10-Year Event	1.07	1.05
100-Year Event	2.31	2.27

Runoff rates have been reduced to all discharge points. – REQUIREMENT SATISFIED

3.3 Water Quality

The proposed basins provide water quality treatment for site runoff through providing one inch of volume abstraction from the site's impervious surfaces.

3.4 Volume Control

The proposed basins provide one inch of volume abstraction from the site's impervious surfaces. This is provided by providing 2" of filtration. The filtration basins provide 2" of volume below their respective outlet elevations.

Stormwater Water Quality and Volume Summary

Drainage Area	Required Filtration Vol. Summary		Filtration Volume = 2.0"*Dist. Impv. Area
	New Impv. Area (sf)	Required Volume (cf)	
PR1A	118617	19770	
PR1B	9266	1544	
PR1C	8162	1360	
PR2	0	0	
TOTAL	136045	22674	

Proposed BMP Area	Provided Vol (cf)	Drawdown Time Calculations (1.6"/Hour)		
		Inf. Area (sf)	Assoc. Inf. Height (ft)	Drawdown Time (h)
Rate Control Basin 1	21516	10324	2.08	15.63
Filtration Basin 2	2052	1908	1.08	8.07
TOTAL	23568			

The project provides volume abstraction for the 1.0" rainfall event as 2.0" of filtration over the new/reconstructed impervious areas. – REQUIREMENT SATISFIED

3.5 Enhanced Stormwater Management for Buffer Exception

This project will be requesting an "Exception" from the MCWD regarding their wetland buffer width and wetland buffer area requirements. As part of this request, this project will be providing enhanced stormwater management to mitigate for the "Exception" request.

The proposed buffer area is not going to be treating any significant runoff from impervious areas. The majority of the site, including the proposed building and parking lot area, will be routed to a proposed underground detention and filtration systems which will provide the required water quality treatment and abstraction volume for the site. The buffer area will only be treating the runoff and rainfall from the area of the buffer itself and small portions of landscape area adjacent to the buffer. There will not be significant TSS or TP loading in the subcatchments that are routed through the buffer or significant TSS or TP treatment provided by the buffer itself. With that info, the current site design does not meet the minimum buffer area requirements of the watershed. To mitigate for the reduced buffer area, we are proposing to provide additional stormwater management equal to the percentage of buffer area that we are less than existing.

Provided Buffer Area = 131,681 SF
Required Buffer Area = 148,621 Sf

Percentage of Buffer Area Provided = 88.6%

This project will provide at least 11.4% additional water quality treatment. This will be provided by increasing the amount of TP removed as part of the project by 11.4% from the designed system. To provide this additional TP removal, a manufactured treatment device will be used in lieu of the underground filtration treatment.

The TP removal for a conforming designed filtration basin with an underground sand filter is as follows:

Conforming Designed TP Removal = 1.31 LBS/YR

Additional TP Removal Required= 1.31 LBS/YR x 11.4% = 0.15 LBS/YR

To demonstrate the increase in TP and DP removal between the conforming filter design and enhanced proprietary filtration device, both systems were modeled in MIDS consistent with MN Stormwater Manual guidance. The results are summarized below.

Phosphorus Remvoal Summary for Filtration Basin 1 v. Phosphosorb Stormfilter

Pollutant	Generated[1]	Conforming (Filtration) Treatment[2]		Enhanced (Stormfilter) Treatment[3]		Increase
	lbs/yr	lbs removed /yr	% Removed	lbs removed /yr	% Removed	lbs removed /yr
TP	5.0880	1.3150	26%	2.5440	50%	1.2290
PP	2.7984	1.3150	47%	1.3990	50%	0.0840
DP	2.2896	0.0000	0%	1.1450	50%	1.1450

[1] Generated Phosphorus values provided from MIDS Calculator

[2] Sand filter removal provided from MIDS calculator as Teir 2, no amendments (>5% drainage area, no iron enchanced sand)

[3] Phsoposorb Media removal provided from MIDS as Teir 1 BMP (conservative estimate) per MN Stormwater Manual Guidance

The proprietary filtration device will be removing an additional 1.23 lbs per year of total phosphorus, which is mostly in the form of dissolved phosphorus. This removal is greater than the 11.4% removal and should satisfy the exception requirement.

4.0 Conclusions:

To the best of our knowledge, this project meets all State, City and Watershed District stormwater management requirements.

Amira of Victoria
Civil Site Group - Stormwater Calculations

Existing Conditions

Drainage Area	Impervious Area		Pervious Area		Total Area	
	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value
EX1	15441	98	337713	80	353154	81
EX2A	61	98	7808	80	7869	80
EX2B	0	98	5531	80	5531	80

Proposed Conditions

Drainage Area	Impervious Area		Impervious Area - Exempt		Pervious Area		Total Area	
	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value
PR1A	118617	98	2539	98	30701	80	151857	94
PR1B	9266	98	738	98	2949	80	12953	94
PR1C	8162	98	9156	98	171161	80	188479	82
PR2	0	98	0	98	13188	80	13188	80

Site Area Summary

	Impervious [SF]	Impervious [AC]	Impervious [SF] - EX.	Impervious [AC] - EX.	Pervious [SF]	Pervious [AC]	Total [SF]	Total [AC]
Existing Site	15502	0.36	--	--	351052	8.06	366554	8.41
Proposed Site	136045	3.12	12433	0.29	217999	5.00	366477	8.41

Stormwater Rate Summary

Drainage Area	Existing Rate (cfs)			
	1-YR [2.49"]	2-YR [2.85"]	10-YR [4.22"]	100-YR [7.25"]
EX1	9.91	12.82	24.85	53.39
EX2A	0.25	0.32	0.63	1.36
EX2B	0.17	0.22	0.44	0.95
TOTAL	10.33	13.36	25.92	55.70

Drainage Area	Proposed Conditions Rate (cfs)			
	1-YR [2.49"]	2-YR [2.85"]	10-YR [4.22"]	100-YR [7.25"]
1P (PR1A)	0.34	0.34	2.15	14.56
2P (PR1B)	0.06	0.06	0.11	1.86
PR1C	6.54	8.34	15.74	33.18
PR2	0.41	0.53	1.05	2.27
TOTAL (REACH)	7.35	9.27	19.05	51.87

Overall Stormwater Rate Summary

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
1-Year Event	10.33	7.35
2-Year Event	13.36	9.27
10-Year Event	25.92	19.05
100-Year Event	55.70	51.87

Stormwater Rate Summary - To Wetland [South]

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
1-Year Event	9.91	6.94
2-Year Event	12.82	8.74
10-Year Event	24.85	18.00
100-Year Event	53.39	49.60

Stormwater Rate Summary - To Highway 5 [North]

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
1-Year Event	0.42	0.41
2-Year Event	0.54	0.53
10-Year Event	1.07	1.05
100-Year Event	2.31	2.27

Stormwater Water Quality and Volume Summary

Drainage Area	Required Filtration Vol. Summary	
	New Impv. Area (sf)	Required Volume (cf)
PR1A	118617	19770
PR1B	9266	1544
PR1C	8162	1360
PR2	0	0
TOTAL	136045	22674

Filtration Volume =
2.0"*Dist. Impv. Area

Proposed BMP Area	Provided Vol (cf)	Drawdown Time Calculations (1.6"/Hour)		
		Inf. Area (sf)	Assoc. Inf. Height (ft)	Drawdown Time (h)
Rate Control Basin 1	21516	10324	2.08	15.63
Filtration Basin 2	2052	1908	1.08	8.07
TOTAL	23568			

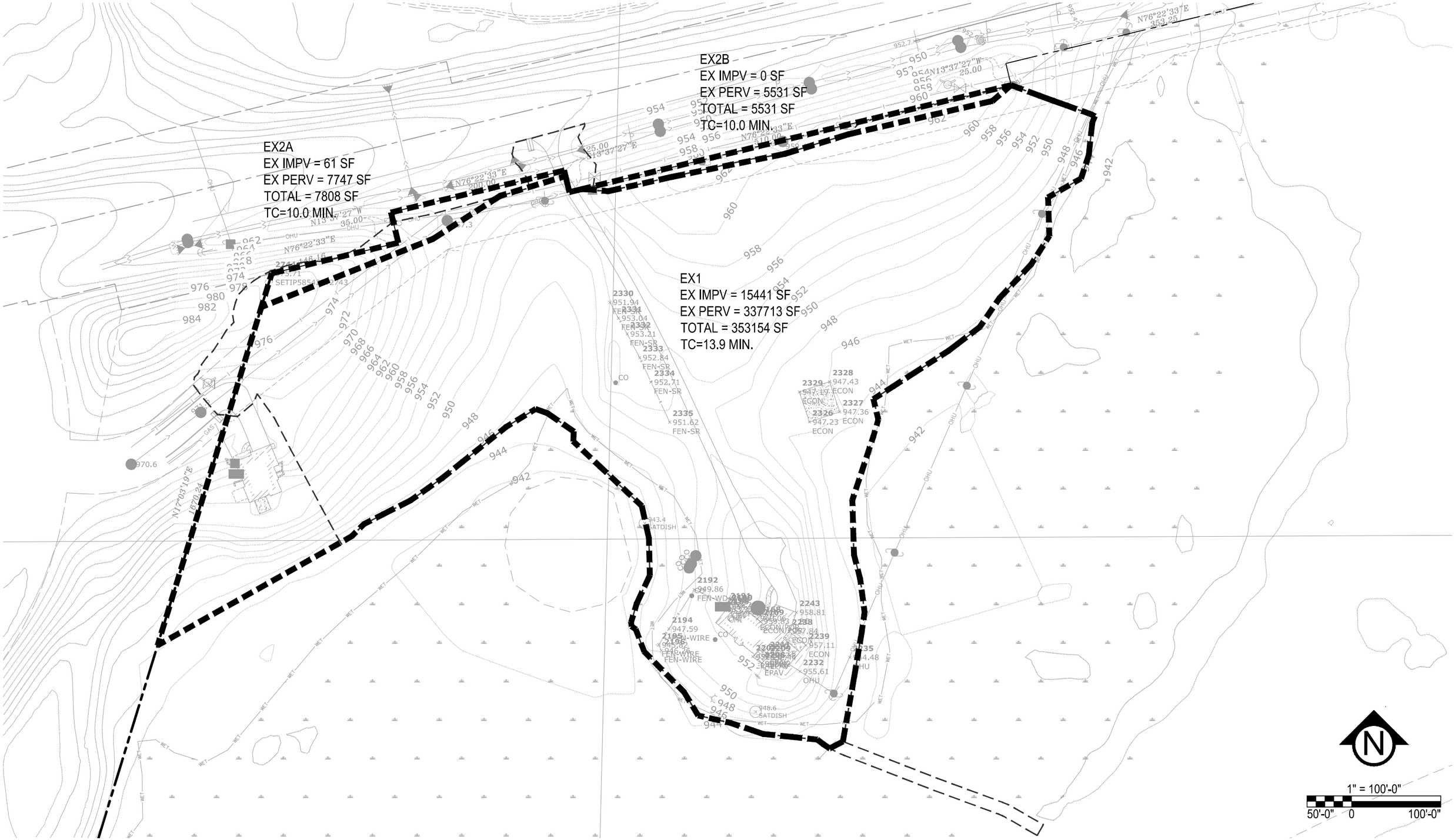
Treated Water Percentage

Treated Impervious Area / New Impervious Area = 94%

Phosphorus Remvoal Summary for Filtration Basin 1 v. Phosphosorb Stormfilter

Pollutant	**Generated[1]**	**Conforming (Filtration) Treatment[2]**		**Enhanced (Stormfilter) Treatment[3]**		**Increase**
	lbs/yr	**lbs removed /yr**	**% Removed**	**lbs removed /yr**	**% Removed**	**lbs removed /yr**
TP	5.0880	1.3150	26%	2.5440	50%	1.2290
PP	2.7984	1.3150	47%	1.3990	50%	0.0840
DP	2.2896	0.0000	0%	1.1450	50%	1.1450

[1] Generated Phosphorus values provided from MIDS Calculator
[2] Sand filter removal provided from MIDS calculator as Teir 2, no amendments (>5% drainage area, no iron enchanced sand)
[3] Phsoposorb Media removal provided from MIDS as Teir 1 BMP (conservative estimate) per MN Stormwater Manual Guidance



AMIRA OF VICTORIA

CivilSite GROUP

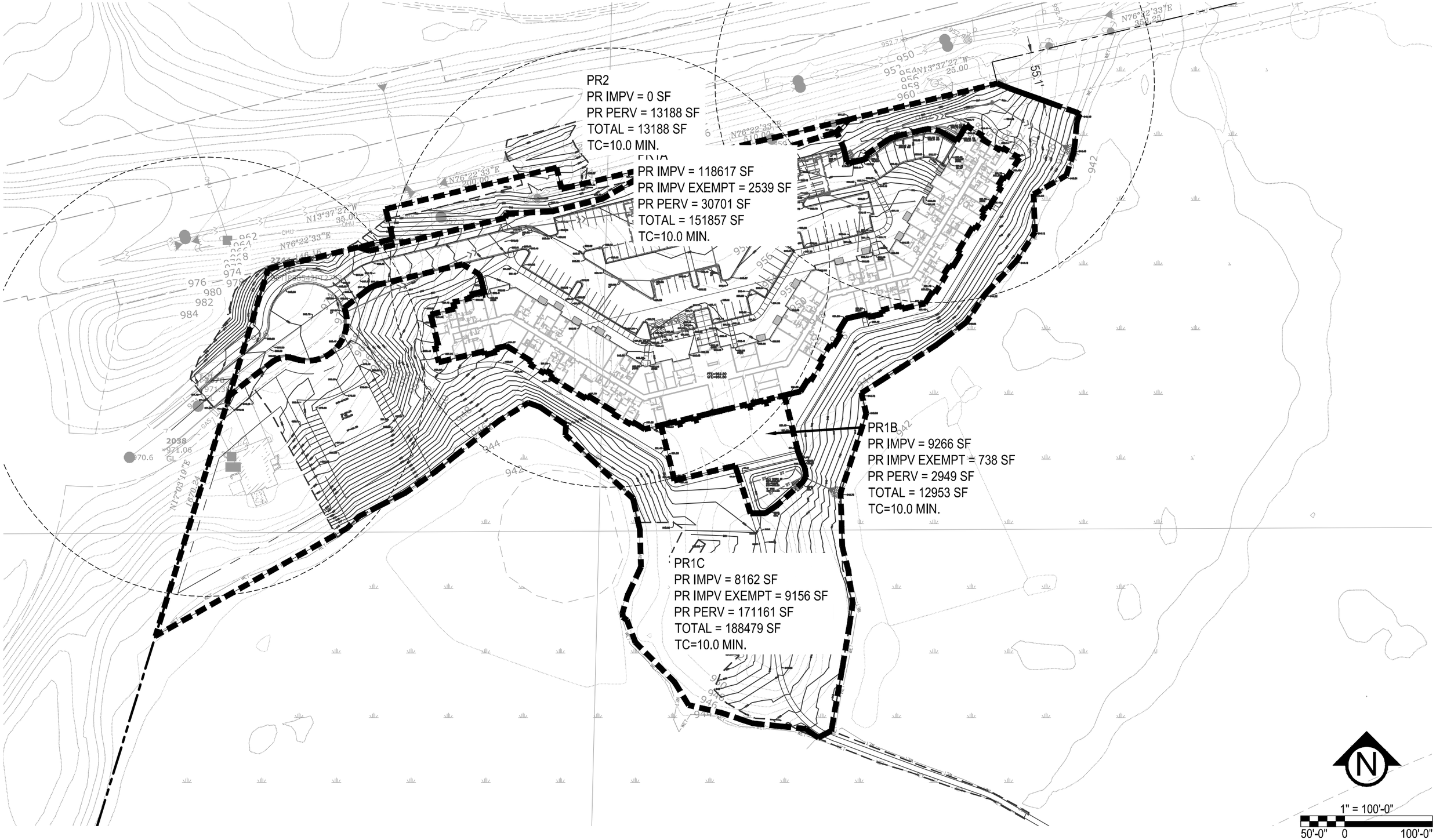
5000 GLENWOOD AVENUE
GOLDEN VALLEY, MN 55422
612-615-0060
www.CivilSiteGroup.com

EXISTING DRAINAGE MAP

2285 ARBORETUM BLVD., VICTORIA, MN 55386

Project Number:	22500	Revision Number:	.
Issue Date:	5/19/23	Revision Date:	.

DA1



AMIRA OF VICTORIA

CivilSite GROUP

5000 GLENWOOD AVENUE
GOLDEN VALLEY, MN 55422
612-615-0060
www.CivilSiteGroup.com

PROPOSED DRAINAGE MAP

2285 ARBORETUM BLVD., VICTORIA, MN 55386

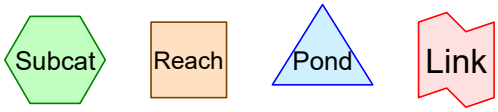
Project Number:	22500	Revision Number:	.
Issue Date:	5/19/23	Revision Date:	6/15/23

DA2

EX2A - DRAINS NORTH TO HIGHWAY 5

EX2B - DRAINS NORTH TO HIGHWAY 5

EX1 - DRAINS SOUTH TO EXISTING WETLAND



Routing Diagram for 22500 - AMIRA VICTORIA EXISTING
Prepared by Civil Site Group, Printed 5/17/2023
HydroCAD® 10.20-3a s/n 02202 © 2023 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	2.49	2
2	2y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	2.85	2
3	10y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	4.22	2
4	100y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	7.25	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.059	80	>75% Grass cover, Good, HSG D (EX1, EX2A, EX2B)
0.356	98	Paved parking, HSG D (EX1, EX2A)
8.415	**81**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
8.415	HSG D	EX1, EX2A, EX2B
0.000	Other	
8.415		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	8.059	0.000	8.059	>75% Grass cover, Good	EX1, EX2A, EX2B
0.000	0.000	0.000	0.356	0.000	0.356	Paved parking	EX1, EX2A
0.000	**0.000**	**0.000**	**8.415**	**0.000**	**8.415**	**TOTAL AREA**	

Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment EX1: EX1 - DRAINS SOUTH Runoff Area=353,154 sf 4.37% Impervious Runoff Depth=0.94"
Flow Length=356' Tc=13.9 min CN=WQ Runoff=9.91 cfs 0.637 af

Subcatchment EX2A: EX2A - DRAINS Runoff Area=7,869 sf 0.78% Impervious Runoff Depth=0.89"
Tc=10.0 min CN=WQ Runoff=0.25 cfs 0.013 af

Subcatchment EX2B: EX2B - DRAINS Runoff Area=5,531 sf 0.00% Impervious Runoff Depth=0.88"
Tc=10.0 min CN=WQ Runoff=0.17 cfs 0.009 af

Total Runoff Area = 8.415 ac Runoff Volume = 0.659 af Average Runoff Depth = 0.94"
95.77% Pervious = 8.059 ac 4.23% Impervious = 0.356 ac

Summary for Subcatchment EX1: EX1 - DRAINS SOUTH TO EXISTING WETLAND

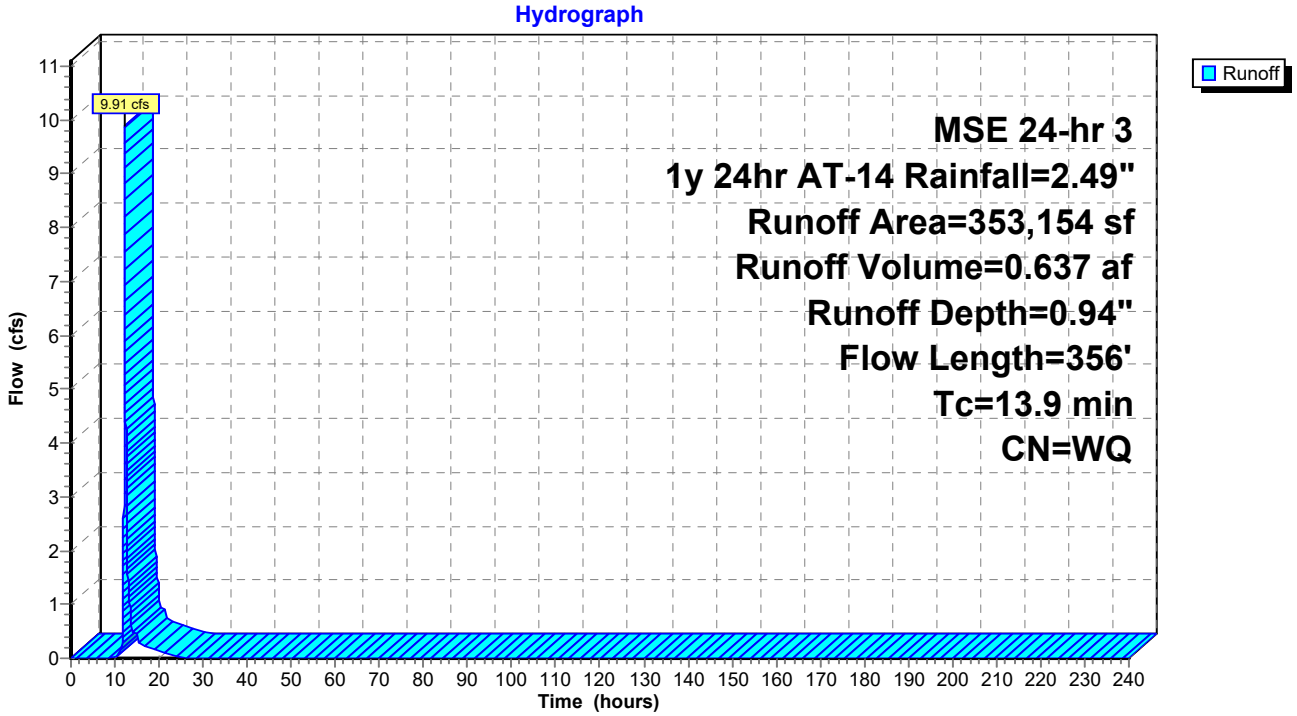
Runoff = 9.91 cfs @ 12.23 hrs, Volume= 0.637 af, Depth= 0.94"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1y 24hr AT-14 Rainfall=2.49"

Area (sf)	CN	Description
15,441	98	Paved parking, HSG D
337,713	80	>75% Grass cover, Good, HSG D
353,154		Weighted Average
337,713		95.63% Pervious Area
15,441		4.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.94"
1.2	256	0.0560	3.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.9	356	Total			

Subcatchment EX1: EX1 - DRAINS SOUTH TO EXISTING WETLAND



Summary for Subcatchment EX2A: EX2A - DRAINS NORTH TO HIGHWAY 5

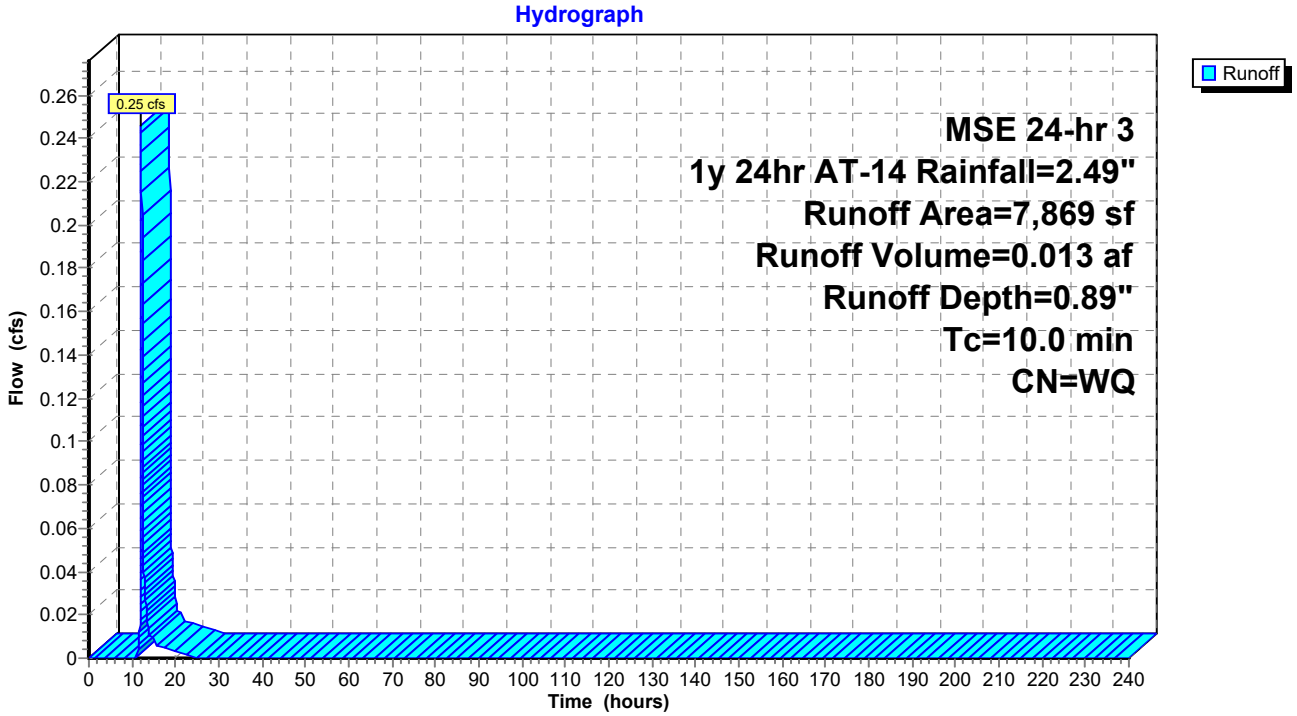
Runoff = 0.25 cfs @ 12.18 hrs, Volume= 0.013 af, Depth= 0.89"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1y 24hr AT-14 Rainfall=2.49"

Area (sf)	CN	Description
61	98	Paved parking, HSG D
7,808	80	>75% Grass cover, Good, HSG D
7,869		Weighted Average
7,808		99.22% Pervious Area
61		0.78% Impervious Area

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

Subcatchment EX2A: EX2A - DRAINS NORTH TO HIGHWAY 5



Summary for Subcatchment EX2B: EX2B - DRAINS NORTH TO HIGHWAY 5

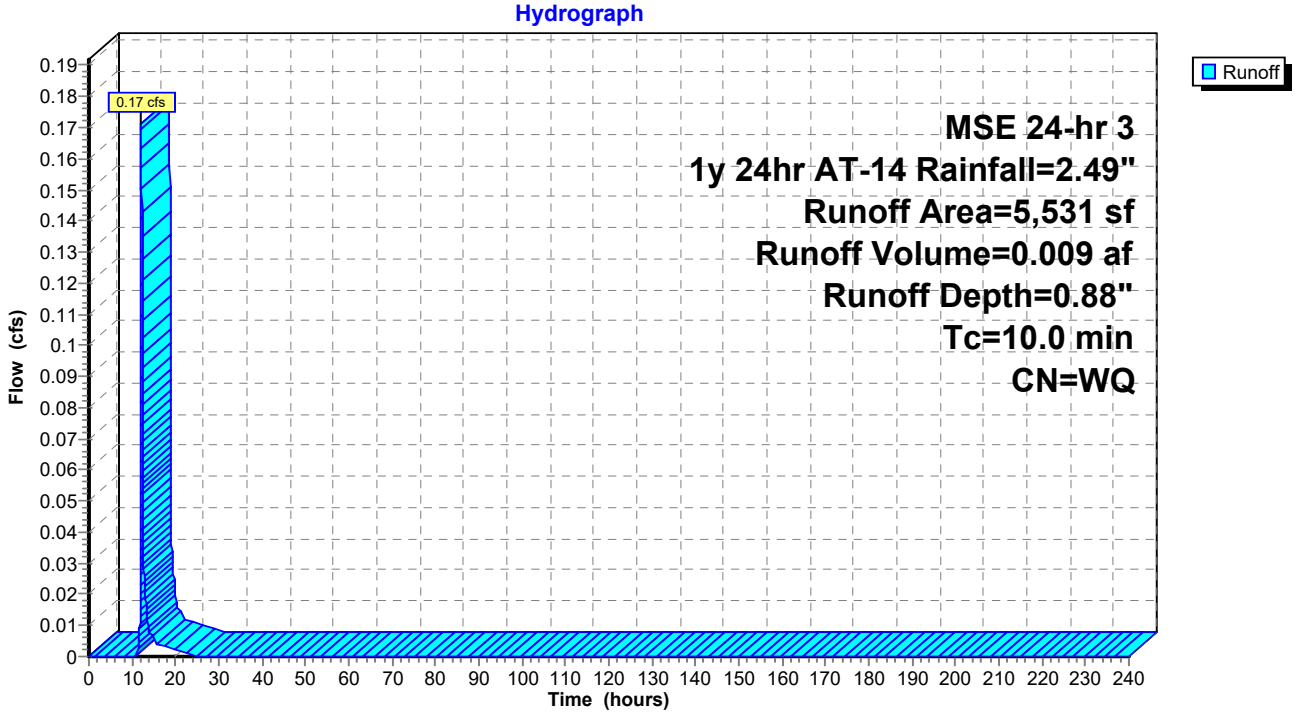
Runoff = 0.17 cfs @ 12.18 hrs, Volume= 0.009 af, Depth= 0.88"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1y 24hr AT-14 Rainfall=2.49"

Area (sf)	CN	Description
0	98	Paved parking, HSG D
5,531	80	>75% Grass cover, Good, HSG D
5,531		Weighted Average
5,531		100.00% Pervious Area

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

Subcatchment EX2B: EX2B - DRAINS NORTH TO HIGHWAY 5



Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment EX1: EX1 - DRAINS SOUTH Runoff Area=353,154 sf 4.37% Impervious Runoff Depth=1.20"
Flow Length=356' Tc=13.9 min CN=WQ Runoff=12.82 cfs 0.813 af

Subcatchment EX2A: EX2A - DRAINS Runoff Area=7,869 sf 0.78% Impervious Runoff Depth=1.15"
Tc=10.0 min CN=WQ Runoff=0.32 cfs 0.017 af

Subcatchment EX2B: EX2B - DRAINS Runoff Area=5,531 sf 0.00% Impervious Runoff Depth=1.14"
Tc=10.0 min CN=WQ Runoff=0.22 cfs 0.012 af

Total Runoff Area = 8.415 ac Runoff Volume = 0.842 af Average Runoff Depth = 1.20"
95.77% Pervious = 8.059 ac 4.23% Impervious = 0.356 ac

Summary for Subcatchment EX1: EX1 - DRAINS SOUTH TO EXISTING WETLAND

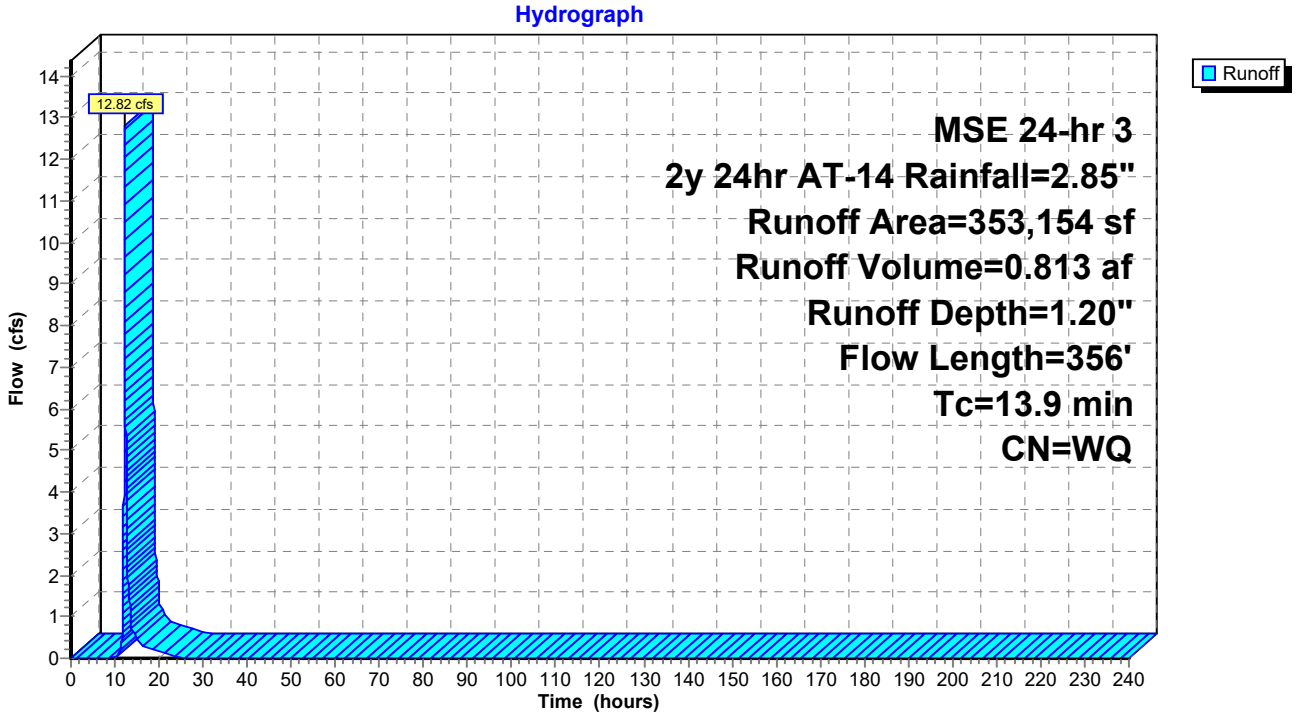
Runoff = 12.82 cfs @ 12.22 hrs, Volume= 0.813 af, Depth= 1.20"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.85"

Area (sf)	CN	Description
15,441	98	Paved parking, HSG D
337,713	80	>75% Grass cover, Good, HSG D
353,154		Weighted Average
337,713		95.63% Pervious Area
15,441		4.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.94"
1.2	256	0.0560	3.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.9	356	Total			

Subcatchment EX1: EX1 - DRAINS SOUTH TO EXISTING WETLAND



Summary for Subcatchment EX2A: EX2A - DRAINS NORTH TO HIGHWAY 5

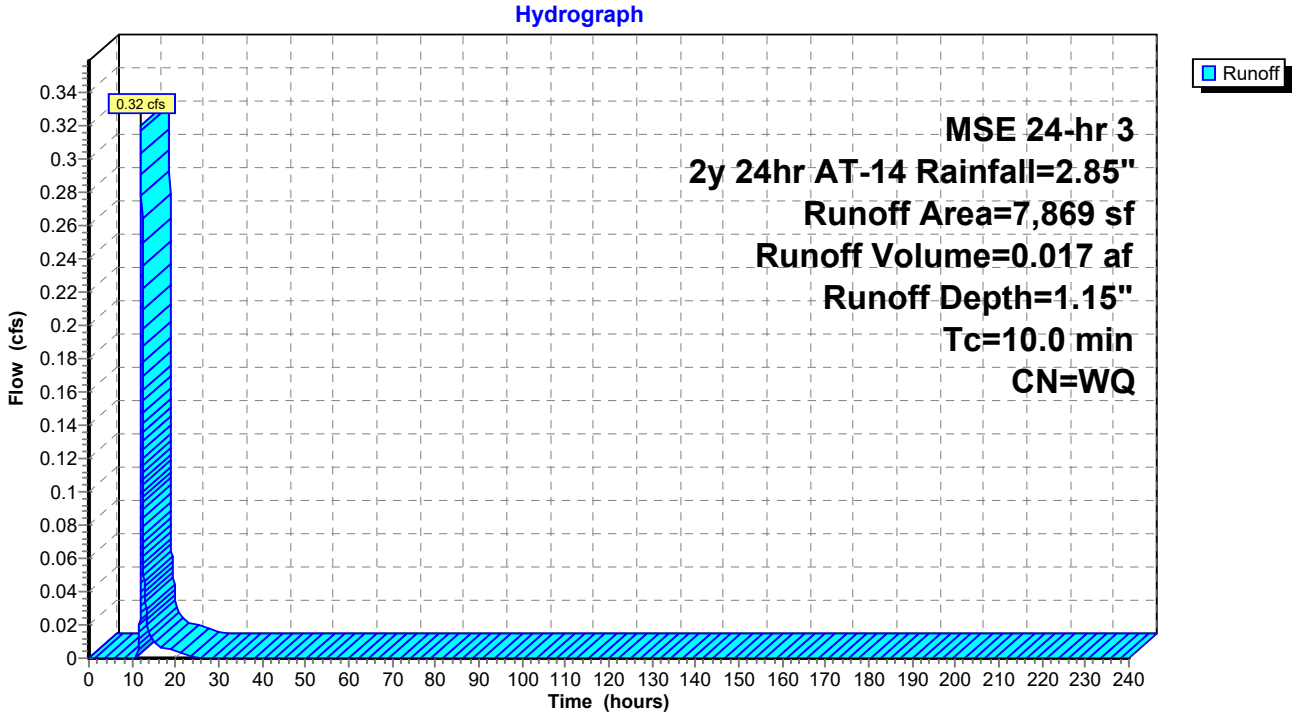
Runoff = 0.32 cfs @ 12.18 hrs, Volume= 0.017 af, Depth= 1.15"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.85"

Area (sf)	CN	Description
61	98	Paved parking, HSG D
7,808	80	>75% Grass cover, Good, HSG D
7,869		Weighted Average
7,808		99.22% Pervious Area
61		0.78% Impervious Area

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

Subcatchment EX2A: EX2A - DRAINS NORTH TO HIGHWAY 5



Summary for Subcatchment EX2B: EX2B - DRAINS NORTH TO HIGHWAY 5

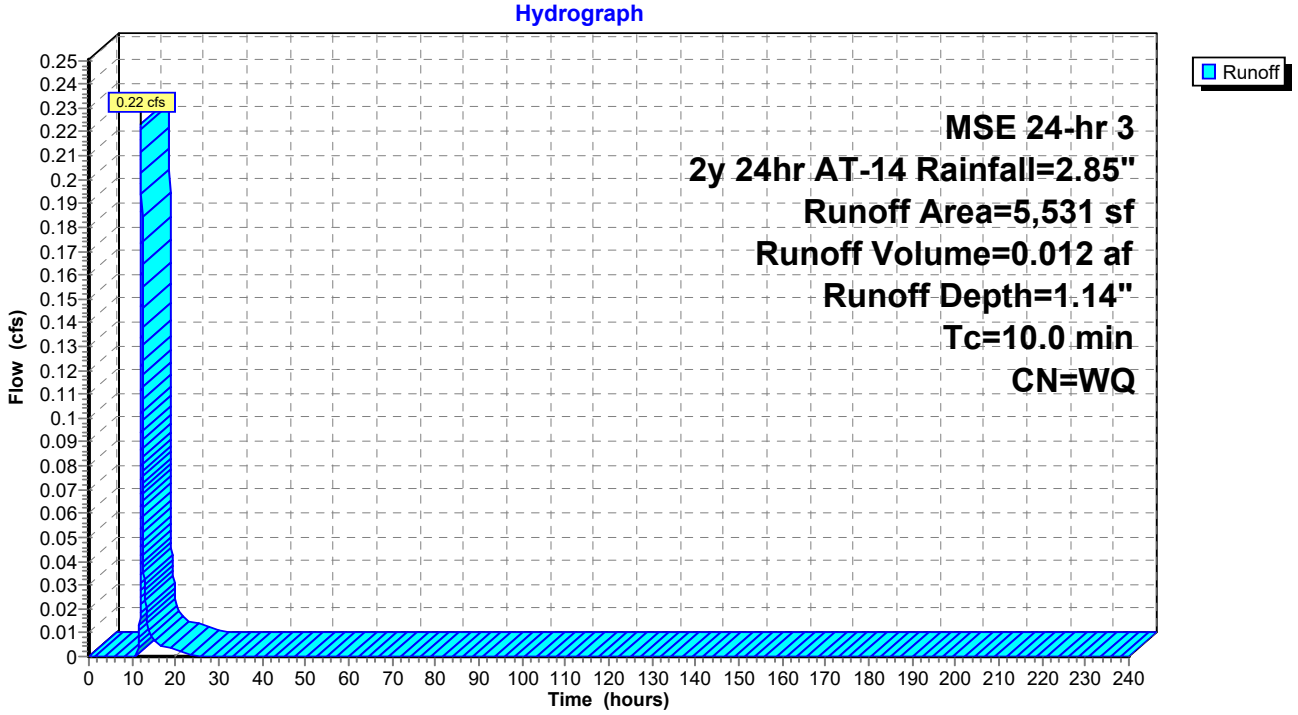
Runoff = 0.22 cfs @ 12.18 hrs, Volume= 0.012 af, Depth= 1.14"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.85"

Area (sf)	CN	Description
0	98	Paved parking, HSG D
5,531	80	>75% Grass cover, Good, HSG D
5,531		Weighted Average
5,531		100.00% Pervious Area

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

Subcatchment EX2B: EX2B - DRAINS NORTH TO HIGHWAY 5



Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment EX1: EX1 - DRAINS SOUTH Runoff Area=353,154 sf 4.37% Impervious Runoff Depth=2.30"
Flow Length=356' Tc=13.9 min CN=WQ Runoff=24.85 cfs 1.555 af

Subcatchment EX2A: EX2A - DRAINS Runoff Area=7,869 sf 0.78% Impervious Runoff Depth=2.24"
Tc=10.0 min CN=WQ Runoff=0.63 cfs 0.034 af

Subcatchment EX2B: EX2B - DRAINS Runoff Area=5,531 sf 0.00% Impervious Runoff Depth=2.22"
Tc=10.0 min CN=WQ Runoff=0.44 cfs 0.024 af

Total Runoff Area = 8.415 ac Runoff Volume = 1.612 af Average Runoff Depth = 2.30"
95.77% Pervious = 8.059 ac 4.23% Impervious = 0.356 ac

Summary for Subcatchment EX1: EX1 - DRAINS SOUTH TO EXISTING WETLAND

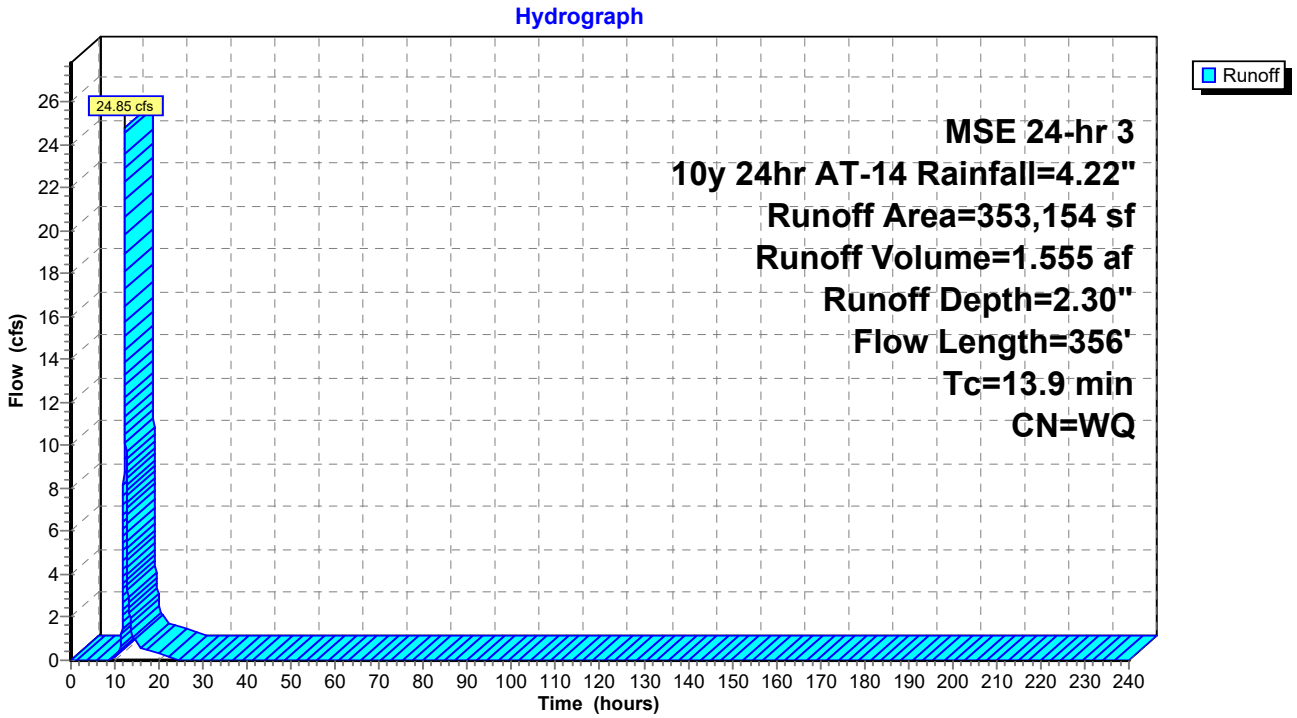
Runoff = 24.85 cfs @ 12.22 hrs, Volume= 1.555 af, Depth= 2.30"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.22"

Area (sf)	CN	Description
15,441	98	Paved parking, HSG D
337,713	80	>75% Grass cover, Good, HSG D
353,154		Weighted Average
337,713		95.63% Pervious Area
15,441		4.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.94"
1.2	256	0.0560	3.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.9	356	Total			

Subcatchment EX1: EX1 - DRAINS SOUTH TO EXISTING WETLAND



Summary for Subcatchment EX2A: EX2A - DRAINS NORTH TO HIGHWAY 5

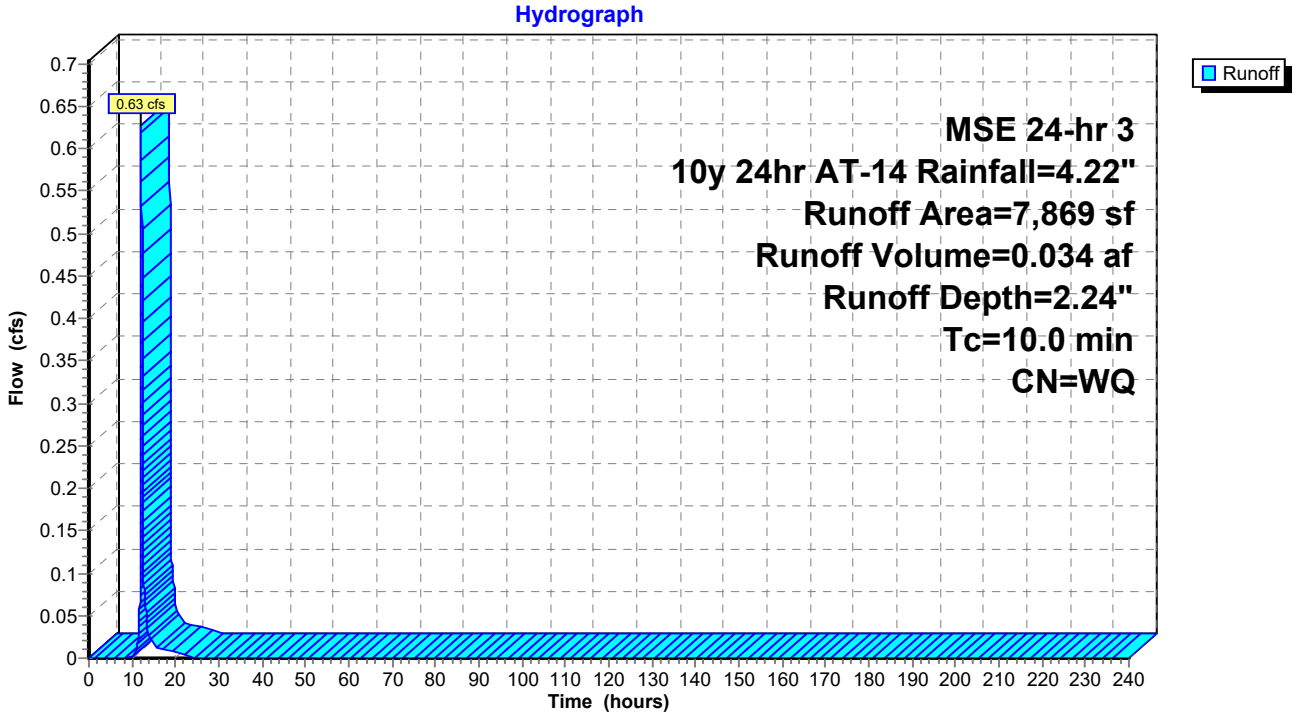
Runoff = 0.63 cfs @ 12.18 hrs, Volume= 0.034 af, Depth= 2.24"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.22"

Area (sf)	CN	Description
61	98	Paved parking, HSG D
7,808	80	>75% Grass cover, Good, HSG D
7,869		Weighted Average
7,808		99.22% Pervious Area
61		0.78% Impervious Area

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

Subcatchment EX2A: EX2A - DRAINS NORTH TO HIGHWAY 5



Summary for Subcatchment EX2B: EX2B - DRAINS NORTH TO HIGHWAY 5

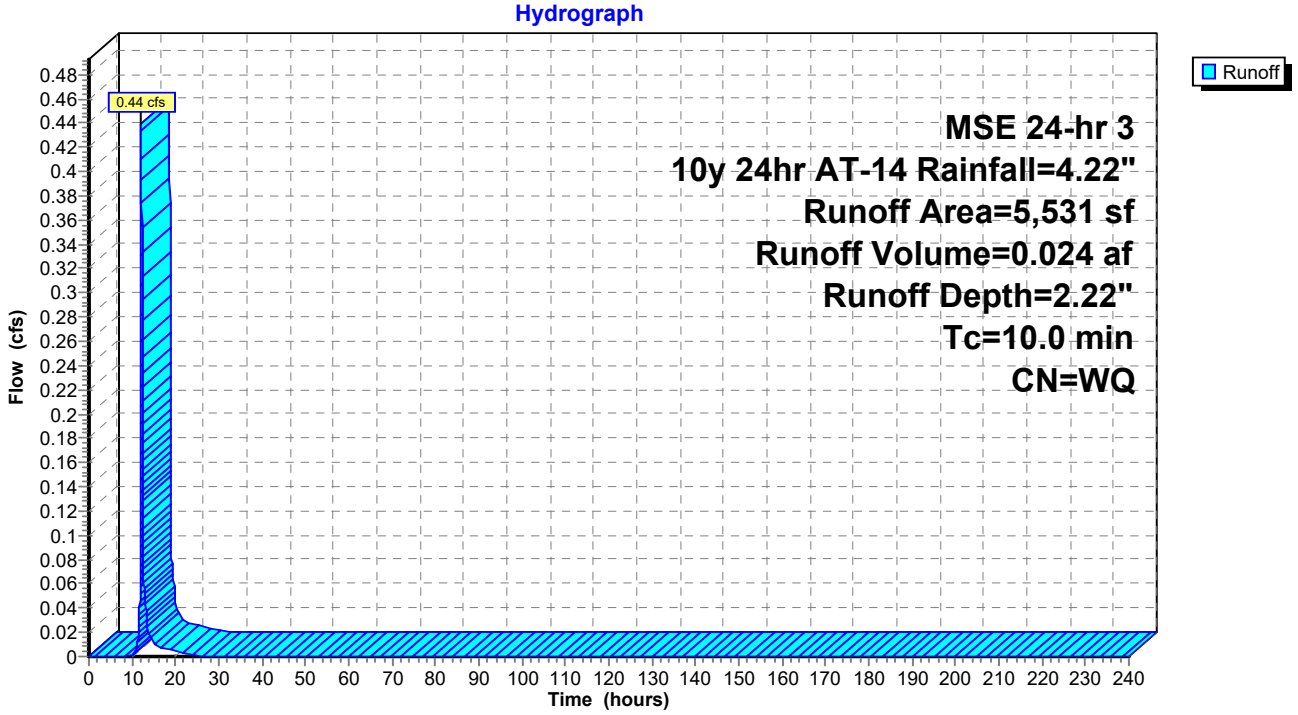
Runoff = 0.44 cfs @ 12.18 hrs, Volume= 0.024 af, Depth= 2.22"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.22"

Area (sf)	CN	Description
0	98	Paved parking, HSG D
5,531	80	>75% Grass cover, Good, HSG D
5,531		Weighted Average
5,531		100.00% Pervious Area

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

Subcatchment EX2B: EX2B - DRAINS NORTH TO HIGHWAY 5



Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment EX1: EX1 - DRAINS SOUTH Runoff Area=353,154 sf 4.37% Impervious Runoff Depth=5.02"
Flow Length=356' Tc=13.9 min CN=WQ Runoff=53.39 cfs 3.389 af

Subcatchment EX2A: EX2A - DRAINS Runoff Area=7,869 sf 0.78% Impervious Runoff Depth=4.94"
Tc=10.0 min CN=WQ Runoff=1.36 cfs 0.074 af

Subcatchment EX2B: EX2B - DRAINS Runoff Area=5,531 sf 0.00% Impervious Runoff Depth=4.93"
Tc=10.0 min CN=WQ Runoff=0.95 cfs 0.052 af

Total Runoff Area = 8.415 ac Runoff Volume = 3.516 af Average Runoff Depth = 5.01"
95.77% Pervious = 8.059 ac 4.23% Impervious = 0.356 ac

Summary for Subcatchment EX1: EX1 - DRAINS SOUTH TO EXISTING WETLAND

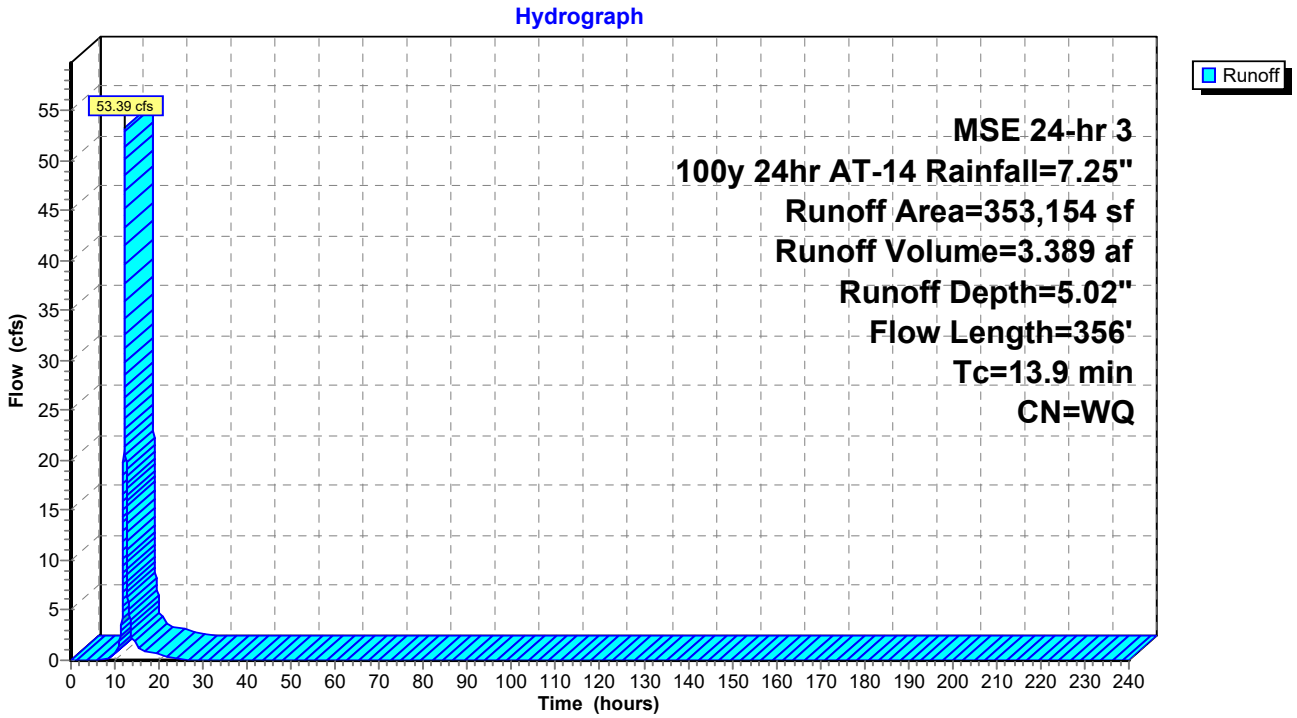
Runoff = 53.39 cfs @ 12.22 hrs, Volume= 3.389 af, Depth= 5.02"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.25"

Area (sf)	CN	Description
15,441	98	Paved parking, HSG D
337,713	80	>75% Grass cover, Good, HSG D
353,154		Weighted Average
337,713		95.63% Pervious Area
15,441		4.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.94"
1.2	256	0.0560	3.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.9	356	Total			

Subcatchment EX1: EX1 - DRAINS SOUTH TO EXISTING WETLAND



Summary for Subcatchment EX2A: EX2A - DRAINS NORTH TO HIGHWAY 5

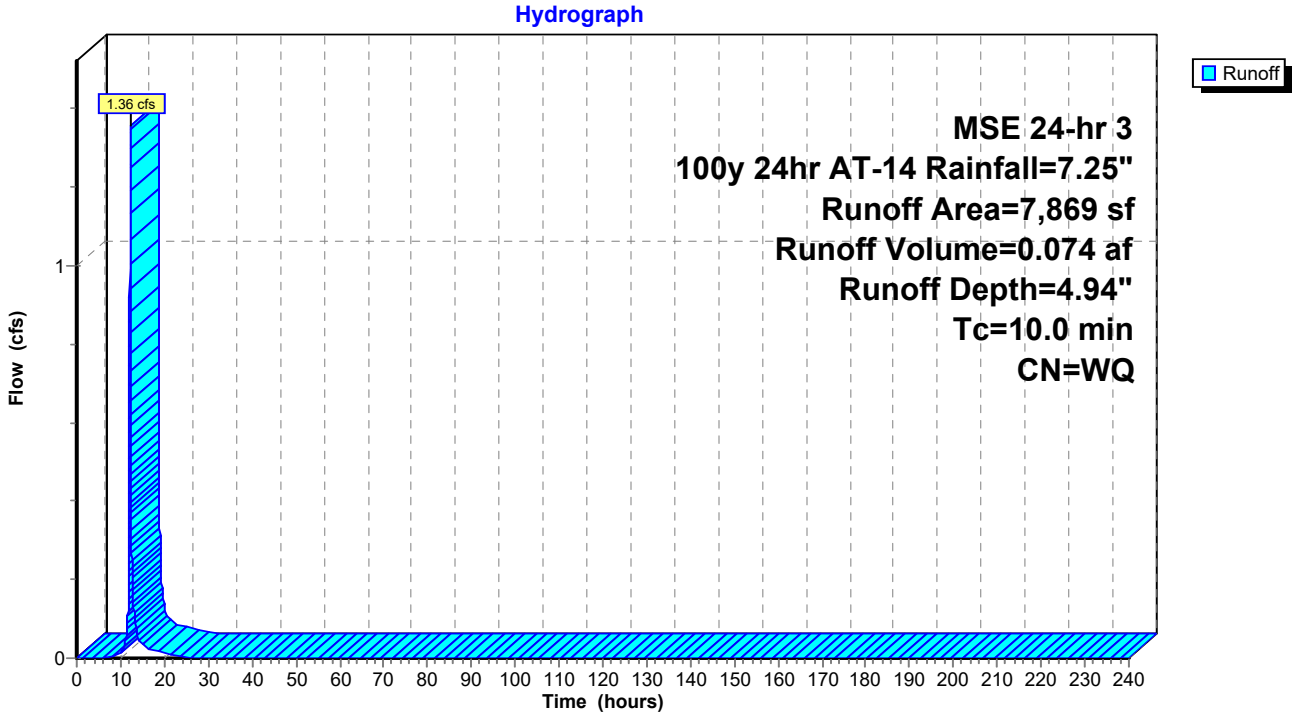
Runoff = 1.36 cfs @ 12.17 hrs, Volume= 0.074 af, Depth= 4.94"
Routed to nonexistent node EX-DA 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.25"

Area (sf)	CN	Description
61	98	Paved parking, HSG D
7,808	80	>75% Grass cover, Good, HSG D
7,869		Weighted Average
7,808		99.22% Pervious Area
61		0.78% Impervious Area

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

Subcatchment EX2A: EX2A - DRAINS NORTH TO HIGHWAY 5



Summary for Subcatchment EX2B: EX2B - DRAINS NORTH TO HIGHWAY 5

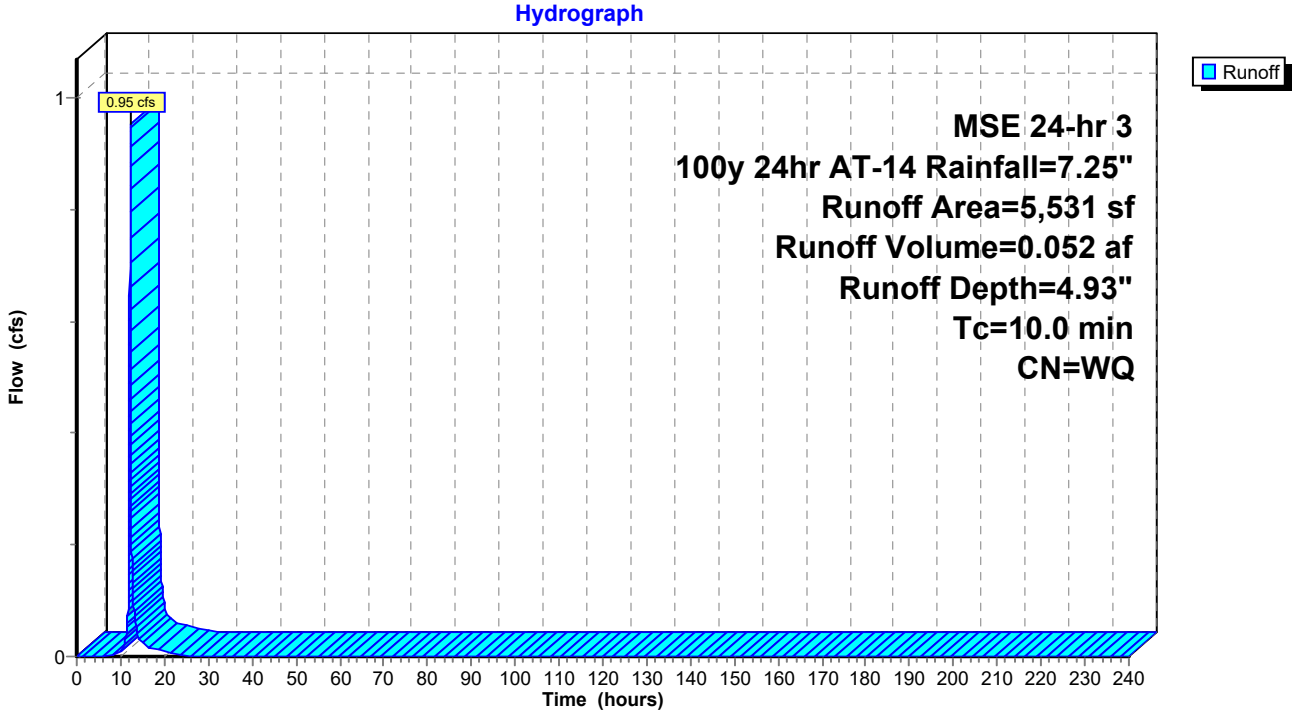
Runoff = 0.95 cfs @ 12.17 hrs, Volume= 0.052 af, Depth= 4.93"
Routed to nonexistent node EX-DA 1

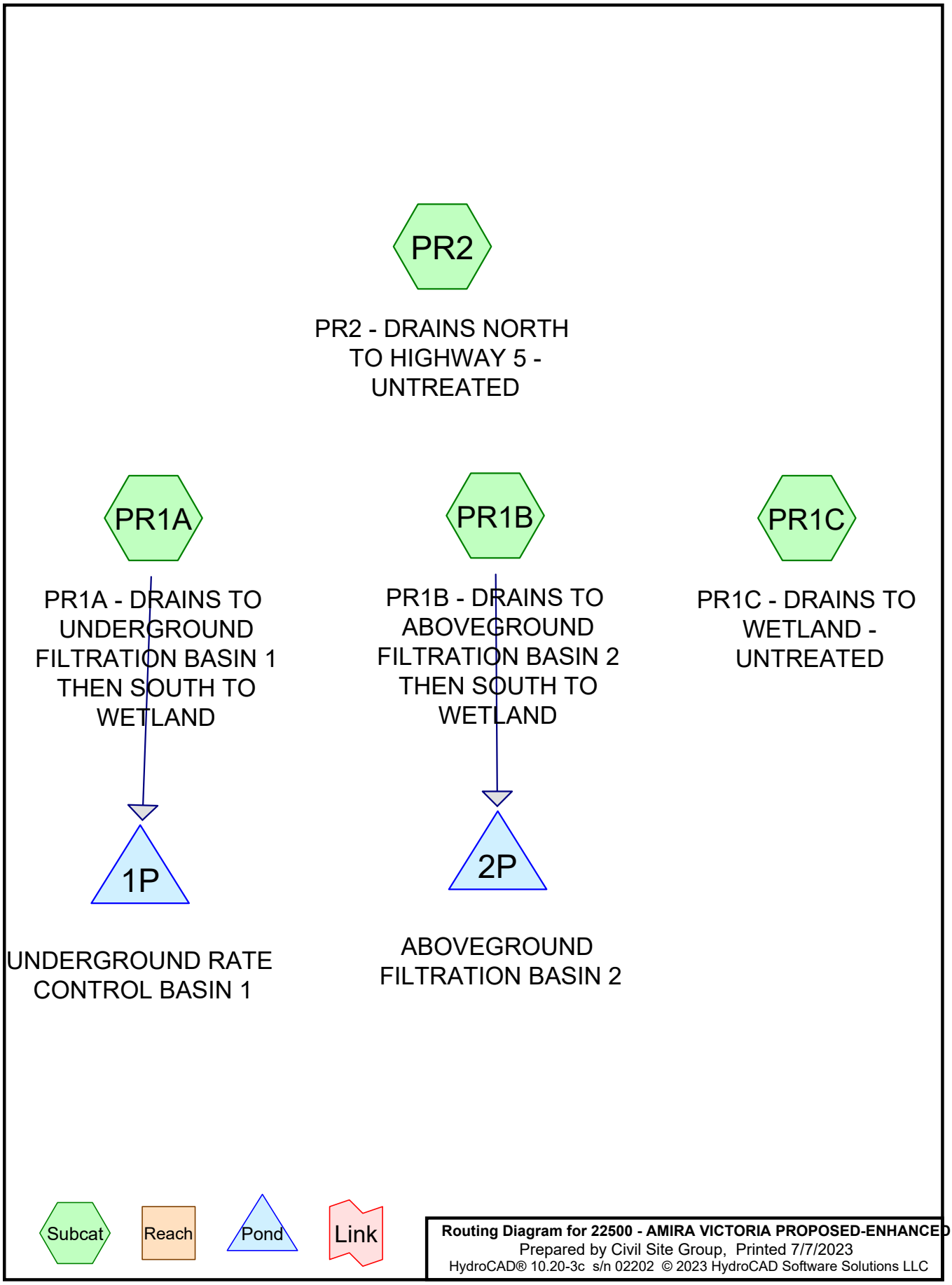
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.25"

Area (sf)	CN	Description
0	98	Paved parking, HSG D
5,531	80	>75% Grass cover, Good, HSG D
5,531		Weighted Average
5,531		100.00% Pervious Area

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

Subcatchment EX2B: EX2B - DRAINS NORTH TO HIGHWAY 5





Routing Diagram for 22500 - AMIRA VICTORIA PROPOSED-ENHANCED
Prepared by Civil Site Group, Printed 7/7/2023
HydroCAD® 10.20-3c s/n 02202 © 2023 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	2.49	2
2	2y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	2.85	2
3	10y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	4.22	2
4	100y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	7.25	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.005	80	>75% Grass cover, Good, HSG D (PR1A, PR1B, PR1C, PR2)
3.409	98	Paved parking, HSG D (PR1A, PR1B, PR1C)
8.413	**87**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
8.413	HSG D	PR1A, PR1B, PR1C, PR2
0.000	Other	
8.413		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	5.005	0.000	5.005	>75% Grass cover, Good	PR1A, PR1B, PR1C, PR2
0.000	0.000	0.000	3.409	0.000	3.409	Paved parking	PR1A, PR1B, PR1C
0.000	**0.000**	**0.000**	**8.413**	**0.000**	**8.413**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1P	947.25	945.00	290.0	0.0078	0.012	0.0	18.0	0.0	
2	2P	946.50	946.00	20.0	0.0250	0.012	0.0	12.0	0.0	

Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment PR1A: PR1A - DRAINS TO Runoff Area=151,857 sf 79.78% Impervious Runoff Depth=1.98"
Tc=10.0 min CN=WQ Runoff=9.64 cfs 0.576 af

Subcatchment PR1B: PR1B - DRAINS TO Runoff Area=12,953 sf 77.23% Impervious Runoff Depth=1.95"
Tc=10.0 min CN=WQ Runoff=0.81 cfs 0.048 af

Subcatchment PR1C: PR1C - DRAINS TO Runoff Area=188,479 sf 9.19% Impervious Runoff Depth=1.01"
Tc=10.0 min CN=WQ Runoff=6.54 cfs 0.364 af

Subcatchment PR2: PR2 - DRAINS NORTH Runoff Area=13,188 sf 0.00% Impervious Runoff Depth=0.88"
Tc=10.0 min CN=WQ Runoff=0.41 cfs 0.022 af

Pond 1P: UNDERGROUND RATE Peak Elev=951.29' Storage=14,807 cf Inflow=9.64 cfs 0.576 af
Outflow=0.34 cfs 0.576 af

Pond 2P: ABOVEGROUND FILTRATION Peak Elev=949.21' Storage=1,017 cf Inflow=0.81 cfs 0.048 af
Primary=0.06 cfs 0.048 af Secondary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.048 af

Total Runoff Area = 8.413 ac Runoff Volume = 1.010 af Average Runoff Depth = 1.44"
59.49% Pervious = 5.005 ac 40.51% Impervious = 3.409 ac

ry for Subcatchment PR1A: PR1A - DRAINS TO UNDERGROUND FILTRATION BASIN 1 THEN SOUTH T

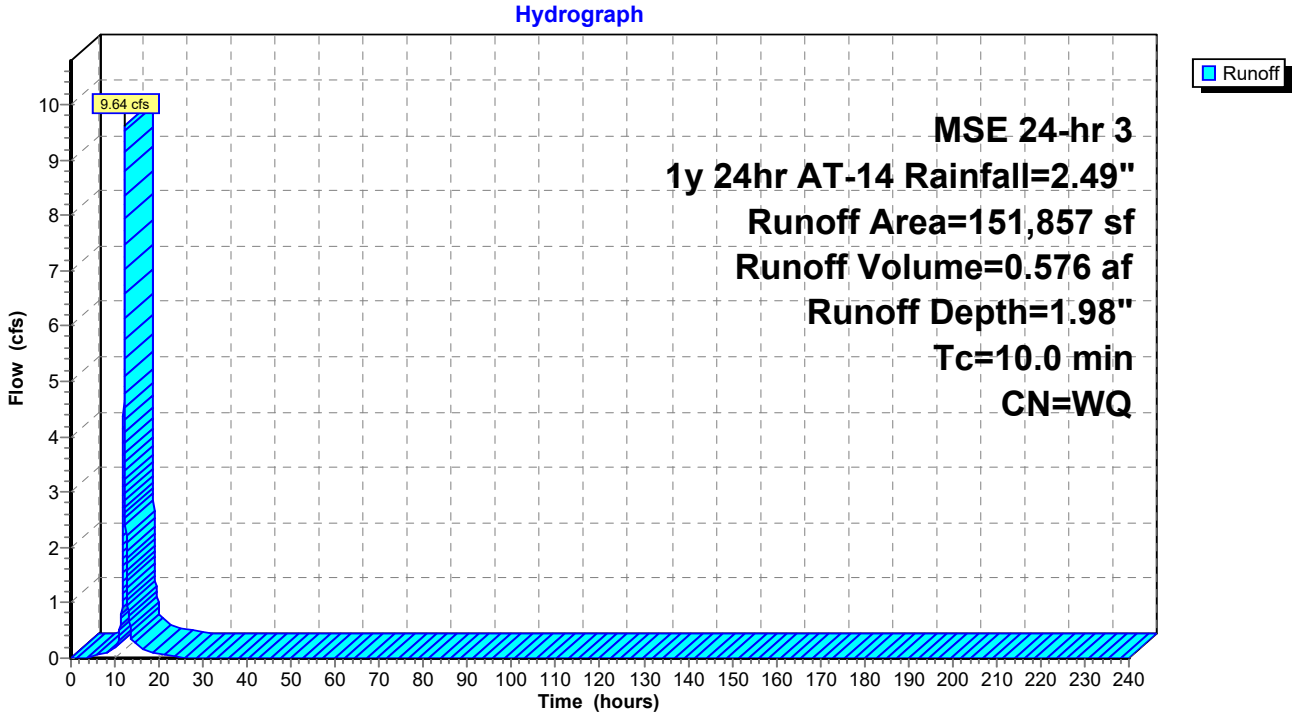
Runoff = 9.64 cfs @ 12.17 hrs, Volume= 0.576 af, Depth= 1.98"
Routed to Pond 1P : UNDERGROUND RATE CONTROL BASIN 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1y 24hr AT-14 Rainfall=2.49"

Area (sf)	CN	Description
121,156	98	Paved parking, HSG D
30,701	80	>75% Grass cover, Good, HSG D
151,857		Weighted Average
30,701		20.22% Pervious Area
121,156		79.78% Impervious Area

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

ubcatchment PR1A: PR1A - DRAINS TO UNDERGROUND FILTRATION BASIN 1 THEN SOUTH TO WETL



ry for Subcatchment PR1B: PR1B - DRAINS TO ABOVEGROUND FILTRATION BASIN 2 THEN SOUTH T

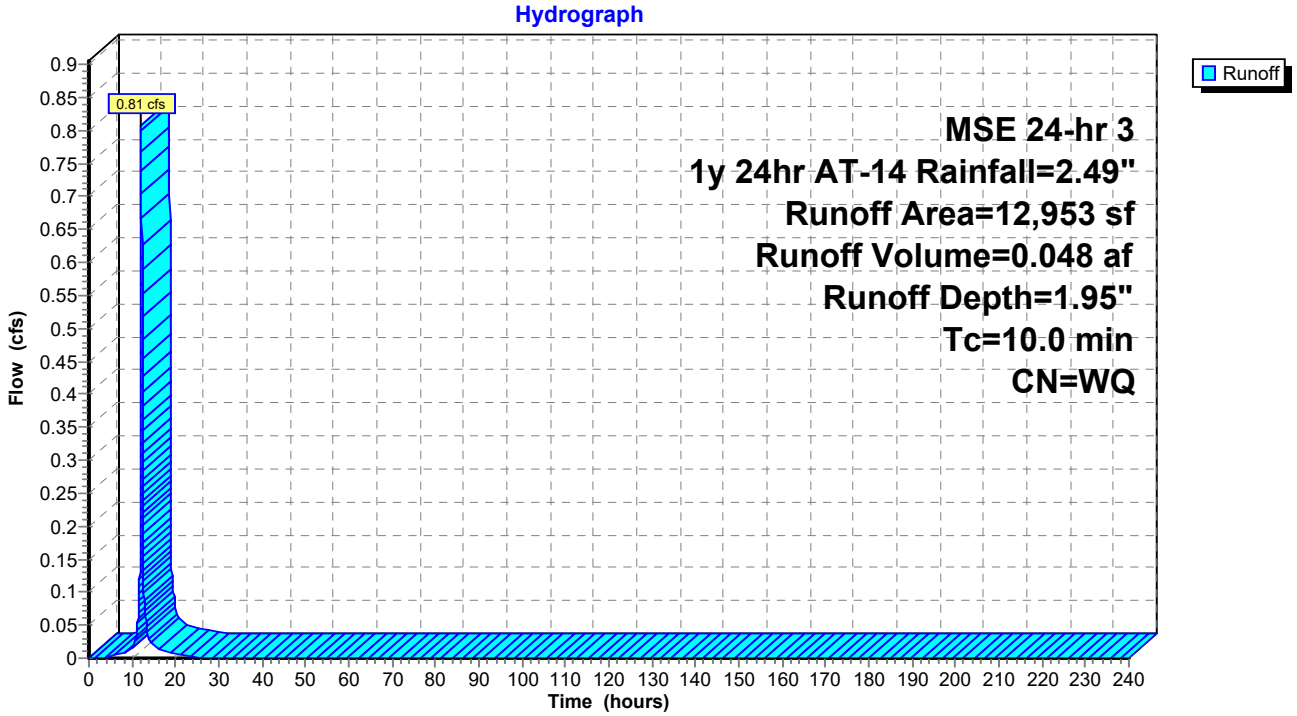
Runoff = 0.81 cfs @ 12.17 hrs, Volume= 0.048 af, Depth= 1.95"
Routed to Pond 2P : ABOVEGROUND FILTRATION BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1y 24hr AT-14 Rainfall=2.49"

Area (sf)	CN	Description
10,004	98	Paved parking, HSG D
2,949	80	>75% Grass cover, Good, HSG D
12,953		Weighted Average
2,949		22.77% Pervious Area
10,004		77.23% Impervious Area

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

ubcatchment PR1B: PR1B - DRAINS TO ABOVEGROUND FILTRATION BASIN 2 THEN SOUTH TO WETI



Summary for Subcatchment PR1C: PR1C - DRAINS TO WETLAND - UNTREATED

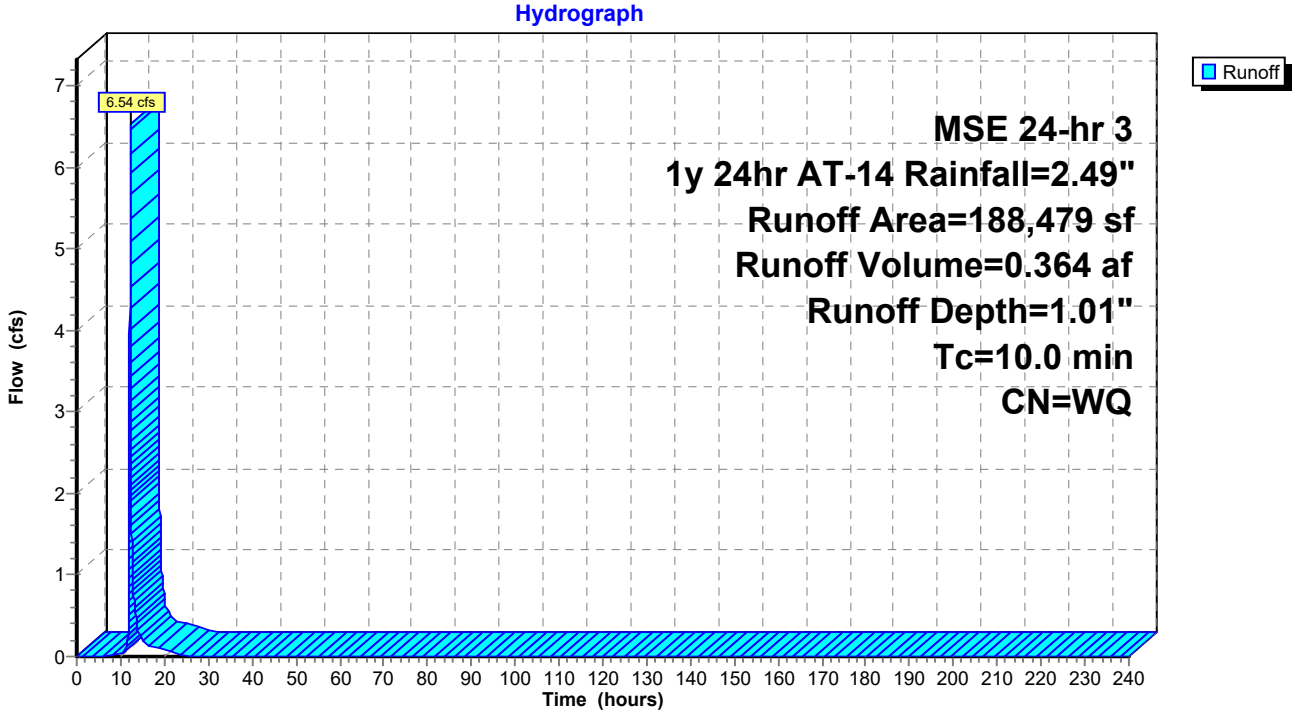
Runoff = 6.54 cfs @ 12.18 hrs, Volume= 0.364 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1y 24hr AT-14 Rainfall=2.49"

Area (sf)	CN	Description
17,318	98	Paved parking, HSG D
171,161	80	>75% Grass cover, Good, HSG D
188,479		Weighted Average
171,161		90.81% Pervious Area
17,318		9.19% Impervious Area

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

Subcatchment PR1C: PR1C - DRAINS TO WETLAND - UNTREATED



Summary for Subcatchment PR2: PR2 - DRAINS NORTH TO HIGHWAY 5 - UNTREATED

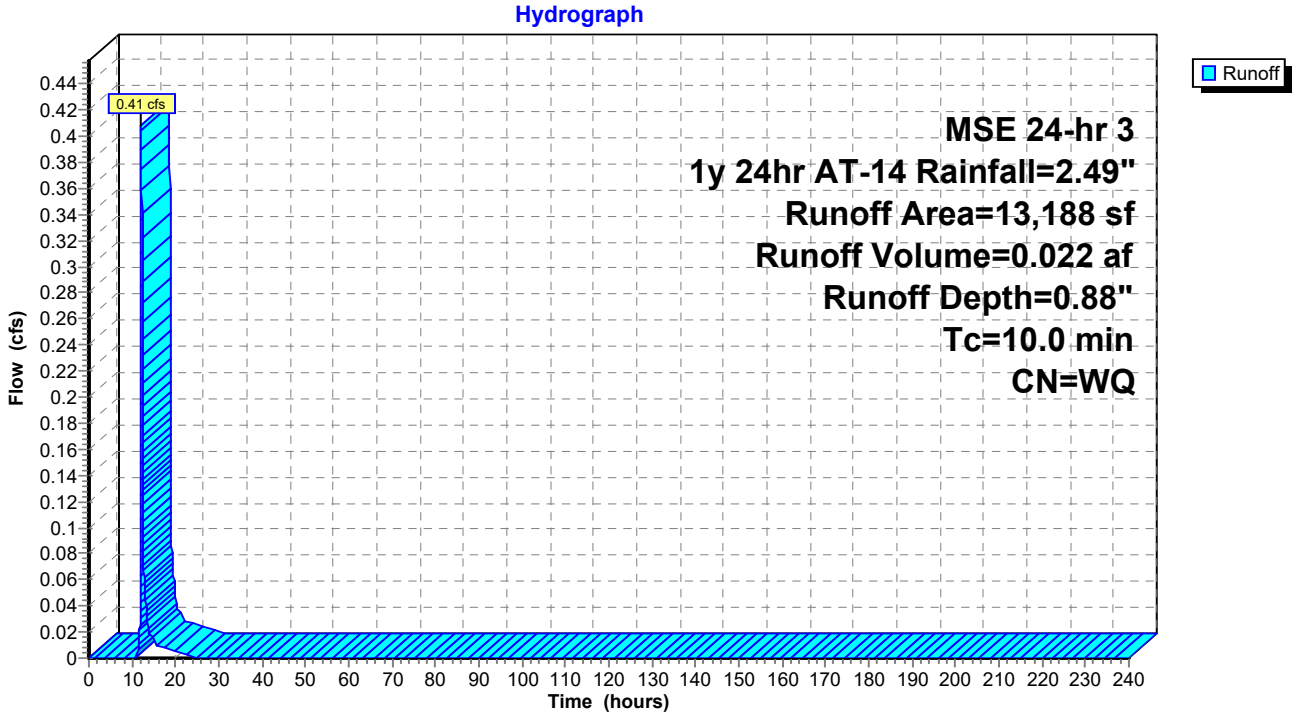
Runoff = 0.41 cfs @ 12.18 hrs, Volume= 0.022 af, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1y 24hr AT-14 Rainfall=2.49"

Area (sf)	CN	Description
0	98	Paved parking, HSG D
13,188	80	>75% Grass cover, Good, HSG D
13,188		Weighted Average
13,188		100.00% Pervious Area

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

Subcatchment PR2: PR2 - DRAINS NORTH TO HIGHWAY 5 - UNTREATED



Summary for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Inflow Area = 3.486 ac, 79.78% Impervious, Inflow Depth = 1.98" for 1y 24hr AT-14 event
Inflow = 9.64 cfs @ 12.17 hrs, Volume= 0.576 af
Outflow = 0.34 cfs @ 10.88 hrs, Volume= 0.576 af, Atten= 96%, Lag= 0.0 min
Primary = 0.34 cfs @ 10.88 hrs, Volume= 0.576 af

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Peak Elev= 951.29' @ 13.71 hrs Surf.Area= 10,324 sf Storage= 14,807 cf

Plug-Flow detention time= 382.5 min calculated for 0.576 af (100% of inflow)
Center-of-Mass det. time= 382.5 min (1,148.5 - 766.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	949.25'	11,678 cf	**44.50'W x 232.00'L x 5.50'H Field A** 56,782 cf Overall - 27,587 cf Embedded = 29,195 cf x 40.0% Voids
#2A	949.25'	27,587 cf	**CMP Round 60** x 66 Inside #1 Effective Size= 60.0"W x 60.0"H => 19.63 sf x 20.00'L = 392.7 cf Overall Size= 60.0"W x 60.0"H x 20.00'L 66 Chambers in 6 Rows 42.50' Header x 19.63 sf x 2 = 1,669.0 cf Inside
		39,265 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	947.25'	**18.0" Round Culvert** L= 290.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 947.25' / 945.00' S= 0.0078 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#2	Device 1	952.10'	**2.1' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	949.25'	**0.340 cfs Constant Flow/Skimmer**

Primary OutFlow Max=0.34 cfs @ 10.88 hrs HW=949.30' (Free Discharge)
└─**1=Culvert** (Passes 0.34 cfs of 8.56 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └─**3=Constant Flow/Skimmer** (Constant Controls 0.34 cfs)

Pond 1P: UNDERGROUND RATE CONTROL BASIN 1 - Chamber Wizard Field A

Chamber Model = CMP Round 60 (Round Corrugated Metal Pipe)
Effective Size= 60.0"W x 60.0"H => 19.63 sf x 20.00'L = 392.7 cf
Overall Size= 60.0"W x 60.0"H x 20.00'L

60.0" Wide + 30.0" Spacing = 90.0" C-C Row Spacing

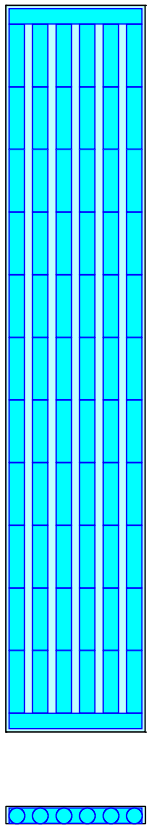
11 Chambers/Row x 20.00' Long +5.00' Header x 2 = 230.00' Row Length +12.0" End Stone x 2 = 232.00' Base Length
6 Rows x 60.0" Wide + 30.0" Spacing x 5 + 12.0" Side Stone x 2 = 44.50' Base Width
60.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

66 Chambers x 392.7 cf + 42.50' Header x 19.63 sf x 2 = 27,587.1 cf Chamber Storage

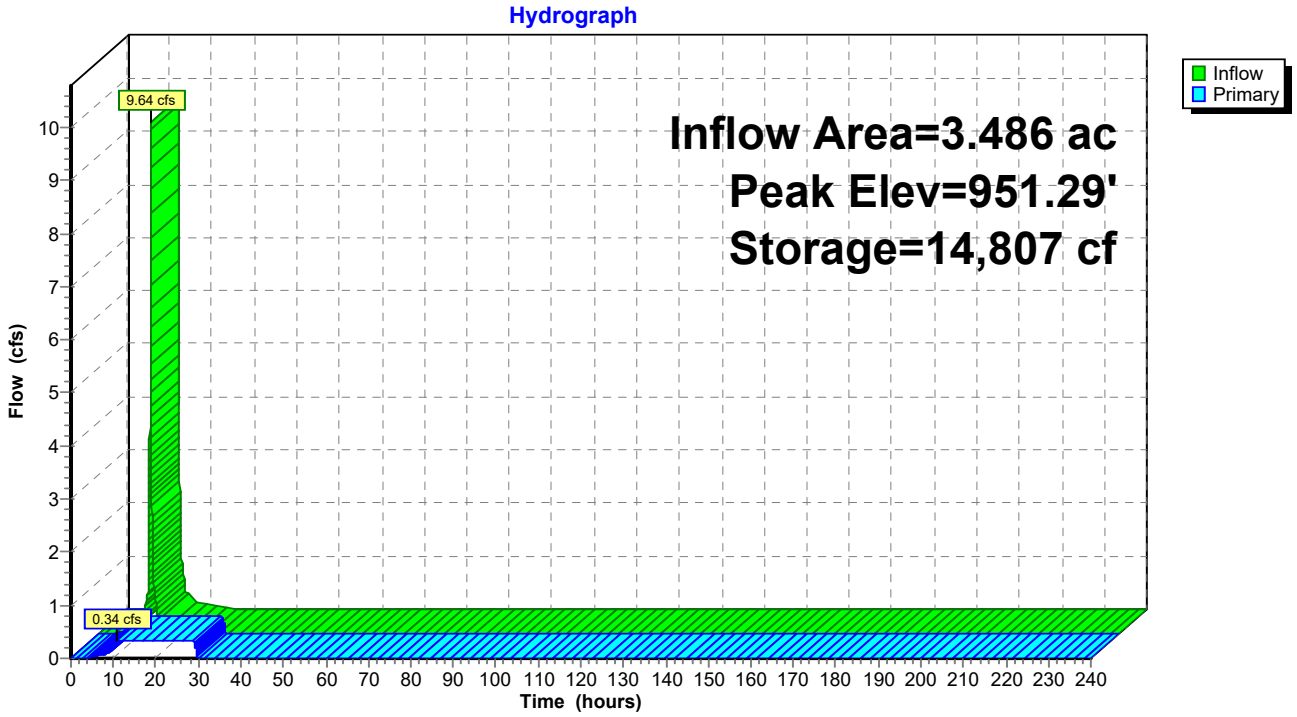
56,782.0 cf Field - 27,587.1 cf Chambers = 29,194.9 cf Stone x 40.0% Voids = 11,678.0 cf Stone Storage

Chamber Storage + Stone Storage = 39,265.1 cf = 0.901 af
Overall Storage Efficiency = 69.2%
Overall System Size = 232.00' x 44.50' x 5.50'

66 Chambers
2,103.0 cy Field
1,081.3 cy Stone



Pond 1P: UNDERGROUND RATE CONTROL BASIN 1



Stage-Discharge for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
949.25	0.00	951.85	0.34	954.45	16.03
949.30	0.34	951.90	0.34	954.50	16.08
949.35	0.34	951.95	0.34	954.55	16.13
949.40	0.34	952.00	0.34	954.60	16.18
949.45	0.34	952.05	0.34	954.65	16.23
949.50	0.34	952.10	0.34	954.70	16.28
949.55	0.34	952.15	0.42	954.75	**16.33**
949.60	0.34	952.20	0.56		
949.65	0.34	952.25	0.73		
949.70	0.34	952.30	0.94		
949.75	0.34	952.35	1.18		
949.80	0.34	952.40	1.44		
949.85	0.34	952.45	1.71		
949.90	0.34	952.50	2.01		
949.95	0.34	952.55	2.32		
950.00	0.34	952.60	2.65		
950.05	0.34	952.65	2.99		
950.10	0.34	952.70	3.35		
950.15	0.34	952.75	3.72		
950.20	0.34	952.80	4.09		
950.25	0.34	952.85	4.48		
950.30	0.34	952.90	4.88		
950.35	0.34	952.95	5.29		
950.40	0.34	953.00	5.70		
950.45	0.34	953.05	6.12		
950.50	0.34	953.10	6.55		
950.55	0.34	953.15	6.99		
950.60	0.34	953.20	7.43		
950.65	0.34	953.25	7.88		
950.70	0.34	953.30	8.34		
950.75	0.34	953.35	8.79		
950.80	0.34	953.40	9.26		
950.85	0.34	953.45	9.73		
950.90	0.34	953.50	10.20		
950.95	0.34	953.55	10.67		
951.00	0.34	953.60	11.15		
951.05	0.34	953.65	11.64		
951.10	0.34	953.70	12.12		
951.15	0.34	953.75	12.61		
951.20	0.34	953.80	13.10		
951.25	0.34	953.85	13.59		
951.30	0.34	953.90	14.08		
951.35	0.34	953.95	14.57		
951.40	0.34	954.00	15.07		
951.45	0.34	954.05	15.57		
951.50	0.34	954.10	15.68		
951.55	0.34	954.15	15.73		
951.60	0.34	954.20	15.78		
951.65	0.34	954.25	15.83		
951.70	0.34	954.30	15.88		
951.75	0.34	954.35	15.93		
951.80	0.34	954.40	15.98		

Stage-Area-Storage for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
949.25	0	951.85	19,434	954.45	38,026
949.30	227	951.90	19,851	954.50	38,233
949.35	492	951.95	20,268	954.55	38,439
949.40	764	952.00	20,685	954.60	38,646
949.45	1,048	952.05	21,100	954.65	38,852
949.50	1,342	952.10	21,516	954.70	39,059
949.55	1,644	952.15	21,931	954.75	**39,265**
949.60	1,955	952.20	22,345		
949.65	2,272	952.25	22,758		
949.70	2,596	952.30	23,171		
949.75	2,926	952.35	23,582		
949.80	3,262	952.40	23,993		
949.85	3,603	952.45	24,402		
949.90	3,949	952.50	24,811		
949.95	4,299	952.55	25,217		
950.00	4,654	952.60	25,623		
950.05	5,013	952.65	26,027		
950.10	5,376	952.70	26,429		
950.15	5,743	952.75	26,829		
950.20	6,113	952.80	27,228		
950.25	6,486	952.85	27,625		
950.30	6,863	952.90	28,020		
950.35	7,243	952.95	28,412		
950.40	7,625	953.00	28,802		
950.45	8,010	953.05	29,190		
950.50	8,398	953.10	29,575		
950.55	8,788	953.15	29,958		
950.60	9,181	953.20	30,337		
950.65	9,575	953.25	30,714		
950.70	9,972	953.30	31,087		
950.75	10,371	953.35	31,458		
950.80	10,771	953.40	31,824		
950.85	11,174	953.45	32,187		
950.90	11,577	953.50	32,546		
950.95	11,983	953.55	32,901		
951.00	12,390	953.60	33,252		
951.05	12,798	953.65	33,597		
951.10	13,207	953.70	33,938		
951.15	13,618	953.75	34,274		
951.20	14,029	953.80	34,604		
951.25	14,442	953.85	34,928		
951.30	14,855	953.90	35,246		
951.35	15,270	953.95	35,556		
951.40	15,684	954.00	35,858		
951.45	16,100	954.05	36,152		
951.50	16,516	954.10	36,436		
951.55	16,932	954.15	36,708		
951.60	17,349	954.20	36,966		
951.65	17,766	954.25	37,200		
951.70	18,183	954.30	37,407		
951.75	18,600	954.35	37,613		
951.80	19,017	954.40	37,820		

Summary for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Inflow Area = 0.297 ac, 77.23% Impervious, Inflow Depth = 1.95" for 1y 24hr AT-14 event
Inflow = 0.81 cfs @ 12.17 hrs, Volume= 0.048 af
Outflow = 0.06 cfs @ 13.20 hrs, Volume= 0.048 af, Atten= 93%, Lag= 61.8 min
Primary = 0.06 cfs @ 13.20 hrs, Volume= 0.048 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Peak Elev= 949.21' @ 13.20 hrs Surf.Area= 1,606 sf Storage= 1,017 cf

Plug-Flow detention time= 146.4 min calculated for 0.048 af (100% of inflow)
Center-of-Mass det. time= 146.4 min (913.3 - 766.9)

Volume	Invert	Avail.Storage	Storage Description
#1	948.50'	3,519 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

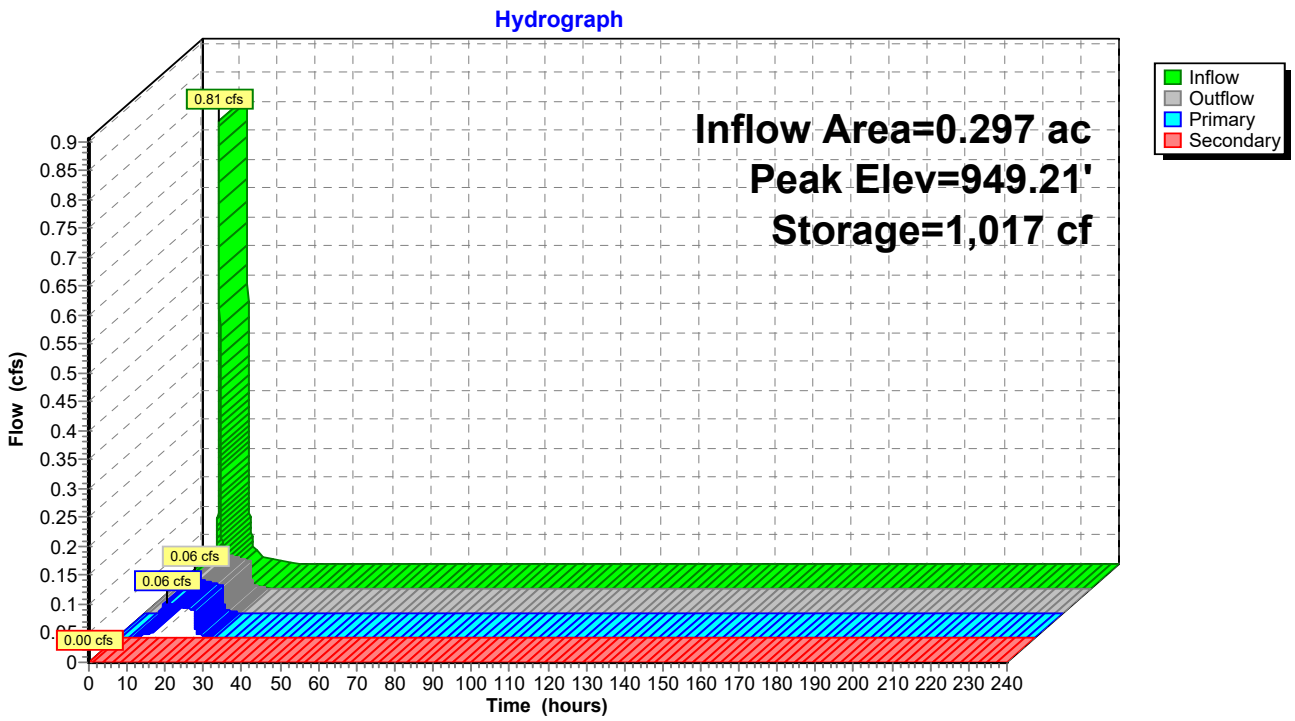
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.50	1,261	0	0
949.00	1,497	690	690
950.00	2,011	1,754	2,444
950.50	2,290	1,075	3,519

Device	Routing	Invert	Outlet Devices
#1	Primary	946.50'	**12.0" Round Culvert** L= 20.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 946.50' / 946.00' S= 0.0250 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	949.80'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	948.50'	**1.600 in/hr Exfiltration over Surface area**
#4	Secondary	950.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.06 cfs @ 13.20 hrs HW=949.21' (Free Discharge)
└─**1=Culvert** (Passes 0.06 cfs of 4.96 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Exfiltration** (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=948.50' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: ABOVEGROUND FILTRATION BASIN 2



Stage-Discharge for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
948.50	0.00	0.00	0.00
948.52	0.05	0.05	0.00
948.54	0.05	0.05	0.00
948.56	0.05	0.05	0.00
948.58	0.05	0.05	0.00
948.60	0.05	0.05	0.00
948.62	0.05	0.05	0.00
948.64	0.05	0.05	0.00
948.66	0.05	0.05	0.00
948.68	0.05	0.05	0.00
948.70	0.05	0.05	0.00
948.72	0.05	0.05	0.00
948.74	0.05	0.05	0.00
948.76	0.05	0.05	0.00
948.78	0.05	0.05	0.00
948.80	0.05	0.05	0.00
948.82	0.05	0.05	0.00
948.84	0.05	0.05	0.00
948.86	0.05	0.05	0.00
948.88	0.05	0.05	0.00
948.90	0.05	0.05	0.00
948.92	0.05	0.05	0.00
948.94	0.05	0.05	0.00
948.96	0.05	0.05	0.00
948.98	0.06	0.06	0.00
949.00	0.06	0.06	0.00
949.02	0.06	0.06	0.00
949.04	0.06	0.06	0.00
949.06	0.06	0.06	0.00
949.08	0.06	0.06	0.00
949.10	0.06	0.06	0.00
949.12	0.06	0.06	0.00
949.14	0.06	0.06	0.00
949.16	0.06	0.06	0.00
949.18	0.06	0.06	0.00
949.20	0.06	0.06	0.00
949.22	0.06	0.06	0.00
949.24	0.06	0.06	0.00
949.26	0.06	0.06	0.00
949.28	0.06	0.06	0.00
949.30	0.06	0.06	0.00
949.32	0.06	0.06	0.00
949.34	0.06	0.06	0.00
949.36	0.06	0.06	0.00
949.38	0.06	0.06	0.00
949.40	0.06	0.06	0.00
949.42	0.06	0.06	0.00
949.44	0.06	0.06	0.00
949.46	0.06	0.06	0.00
949.48	0.06	0.06	0.00
949.50	0.06	0.06	0.00
949.52	0.07	0.07	0.00
949.54	0.07	0.07	0.00
949.56	0.07	0.07	0.00
949.58	0.07	0.07	0.00
949.60	0.07	0.07	0.00
949.62	0.07	0.07	0.00
949.64	0.07	0.07	0.00
949.66	0.07	0.07	0.00
949.68	0.07	0.07	0.00
949.70	0.07	0.07	0.00
949.72	0.07	0.07	0.00
949.74	0.07	0.07	0.00
949.76	0.07	0.07	0.00
949.78	0.07	0.07	0.00
949.80	0.07	0.07	0.00
949.82	0.10	0.10	0.00
949.84	0.15	0.15	0.00
949.86	0.22	0.22	0.00
949.88	0.30	0.30	0.00
949.90	0.40	0.40	0.00
949.92	0.50	0.50	0.00
949.94	0.61	0.61	0.00
949.96	0.73	0.73	0.00
949.98	0.86	0.86	0.00
950.00	0.99	0.99	0.00
950.02	1.19	1.13	0.05
950.04	1.44	1.28	0.15
950.06	1.72	1.44	0.28
950.08	2.03	1.60	0.43
950.10	2.37	1.76	0.60
950.12	2.73	1.94	0.79
950.14	3.11	2.11	1.00
950.16	3.52	2.30	1.22
950.18	3.86	2.41	1.45
950.20	4.17	2.47	1.70
950.22	4.51	2.53	1.98
950.24	4.86	2.59	2.27
950.26	5.22	2.64	2.58
950.28	5.60	2.70	2.90
950.30	5.99	2.75	3.23
950.32	6.39	2.81	3.59
950.34	6.81	2.86	3.95
950.36	7.25	2.91	4.33
950.38	7.69	2.96	4.73
950.40	8.15	3.01	5.14
950.42	8.62	3.06	5.56
950.44	9.11	3.11	6.00
950.46	9.61	3.16	6.45
950.48	10.12	3.20	6.92
950.50	**10.65**	**3.25**	**7.40**

Stage-Area-Storage for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
948.50	1,261	0
948.52	1,270	25
948.54	1,280	51
948.56	1,289	77
948.58	1,299	102
948.60	1,308	128
948.62	1,318	155
948.64	1,327	181
948.66	1,337	208
948.68	1,346	235
948.70	1,355	262
948.72	1,365	289
948.74	1,374	316
948.76	1,384	344
948.78	1,393	372
948.80	1,403	400
948.82	1,412	428
948.84	1,421	456
948.86	1,431	485
948.88	1,440	513
948.90	1,450	542
948.92	1,459	571
948.94	1,469	601
948.96	1,478	630
948.98	1,488	660
949.00	1,497	690
949.02	1,507	720
949.04	1,518	750
949.06	1,528	780
949.08	1,538	811
949.10	1,548	842
949.12	1,559	873
949.14	1,569	904
949.16	1,579	936
949.18	1,590	967
949.20	1,600	999
949.22	1,610	1,031
949.24	1,620	1,064
949.26	1,631	1,096
949.28	1,641	1,129
949.30	1,651	1,162
949.32	1,661	1,195
949.34	1,672	1,228
949.36	1,682	1,262
949.38	1,692	1,295
949.40	1,703	1,329
949.42	1,713	1,364
949.44	1,723	1,398
949.46	1,733	1,433
949.48	1,744	1,467
949.50	1,754	1,502
949.52	1,764	1,537
949.54	1,775	1,573
949.56	1,785	1,608
949.58	1,795	1,644
949.60	1,805	1,680
949.62	1,816	1,716
949.64	1,826	1,753
949.66	1,836	1,789
949.68	1,847	1,826
949.70	1,857	1,863
949.72	1,867	1,901
949.74	1,877	1,938
949.76	1,888	1,976
949.78	1,898	2,014
949.80	1,908	2,052
949.82	1,918	2,090
949.84	1,929	2,128
949.86	1,939	2,167
949.88	1,949	2,206
949.90	1,960	2,245
949.92	1,970	2,284
949.94	1,980	2,324
949.96	1,990	2,363
949.98	2,001	2,403
950.00	2,011	2,444
950.02	2,022	2,484
950.04	2,033	2,524
950.06	2,044	2,565
950.08	2,056	2,606
950.10	2,067	2,647
950.12	2,078	2,689
950.14	2,089	2,731
950.16	2,100	2,772
950.18	2,111	2,815
950.20	2,123	2,857
950.22	2,134	2,899
950.24	2,145	2,942
950.26	2,156	2,985
950.28	2,167	3,028
950.30	2,178	3,072
950.32	2,190	3,116
950.34	2,201	3,159
950.36	2,212	3,204
950.38	2,223	3,248
950.40	2,234	3,293
950.42	2,245	3,337
950.44	2,257	3,382
950.46	2,268	3,428
950.48	2,279	3,473
950.50	**2,290**	**3,519**

Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment PR1A: PR1A - DRAINS TO Runoff Area=151,857 sf 79.78% Impervious Runoff Depth=2.32"
Tc=10.0 min CN=WQ Runoff=11.23 cfs 0.674 af

Subcatchment PR1B: PR1B - DRAINS TO Runoff Area=12,953 sf 77.23% Impervious Runoff Depth=2.28"
Tc=10.0 min CN=WQ Runoff=0.94 cfs 0.057 af

Subcatchment PR1C: PR1C - DRAINS TO Runoff Area=188,479 sf 9.19% Impervious Runoff Depth=1.27"
Tc=10.0 min CN=WQ Runoff=8.34 cfs 0.460 af

Subcatchment PR2: PR2 - DRAINS NORTH Runoff Area=13,188 sf 0.00% Impervious Runoff Depth=1.14"
Tc=10.0 min CN=WQ Runoff=0.53 cfs 0.029 af

Pond 1P: UNDERGROUND RATE Peak Elev=951.67' Storage=17,895 cf Inflow=11.23 cfs 0.674 af
Outflow=0.34 cfs 0.674 af

Pond 2P: ABOVEGROUND FILTRATION Peak Elev=949.35' Storage=1,246 cf Inflow=0.94 cfs 0.057 af
Primary=0.06 cfs 0.057 af Secondary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.057 af

Total Runoff Area = 8.413 ac Runoff Volume = 1.219 af Average Runoff Depth = 1.74"
59.49% Pervious = 5.005 ac 40.51% Impervious = 3.409 ac

ry for Subcatchment PR1A: PR1A - DRAINS TO UNDERGROUND FILTRATION BASIN 1 THEN SOUTH T

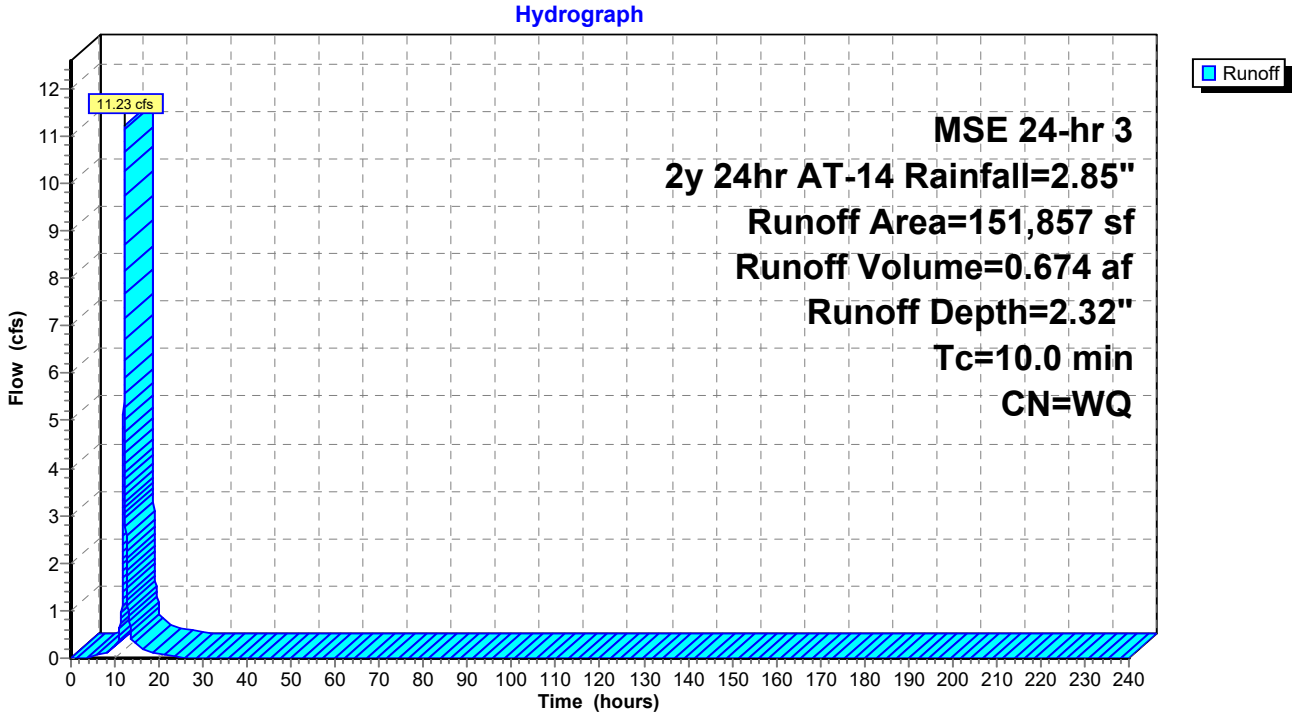
Runoff = 11.23 cfs @ 12.17 hrs, Volume= 0.674 af, Depth= 2.32"
Routed to Pond 1P : UNDERGROUND RATE CONTROL BASIN 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.85"

Area (sf)	CN	Description
121,156	98	Paved parking, HSG D
30,701	80	>75% Grass cover, Good, HSG D
151,857		Weighted Average
30,701		20.22% Pervious Area
121,156		79.78% Impervious Area

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

ubcatchment PR1A: PR1A - DRAINS TO UNDERGROUND FILTRATION BASIN 1 THEN SOUTH TO WET



ry for Subcatchment PR1B: PR1B - DRAINS TO ABOVEGROUND FILTRATION BASIN 2 THEN SOUTH T

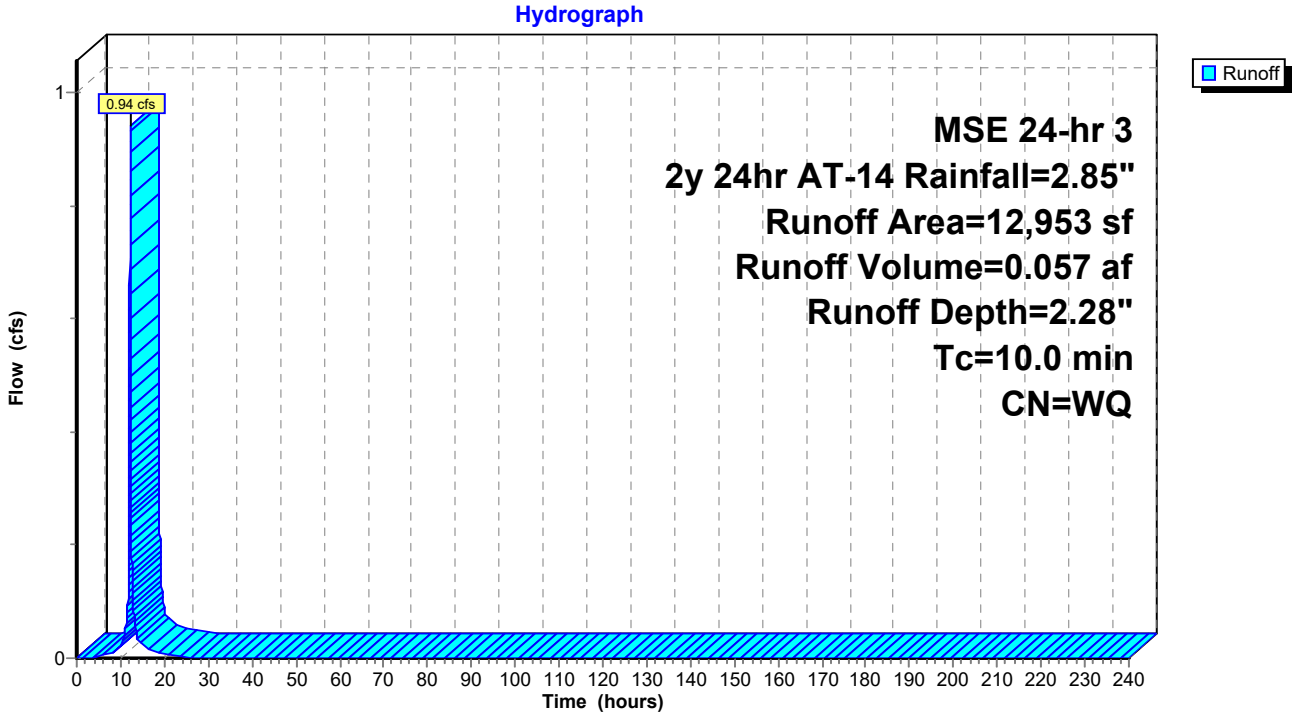
Runoff = 0.94 cfs @ 12.17 hrs, Volume= 0.057 af, Depth= 2.28"
Routed to Pond 2P : ABOVEGROUND FILTRATION BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.85"

Area (sf)	CN	Description
10,004	98	Paved parking, HSG D
2,949	80	>75% Grass cover, Good, HSG D
12,953		Weighted Average
2,949		22.77% Pervious Area
10,004		77.23% Impervious Area

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

ubcatchment PR1B: PR1B - DRAINS TO ABOVEGROUND FILTRATION BASIN 2 THEN SOUTH TO WETL



Summary for Subcatchment PR1C: PR1C - DRAINS TO WETLAND - UNTREATED

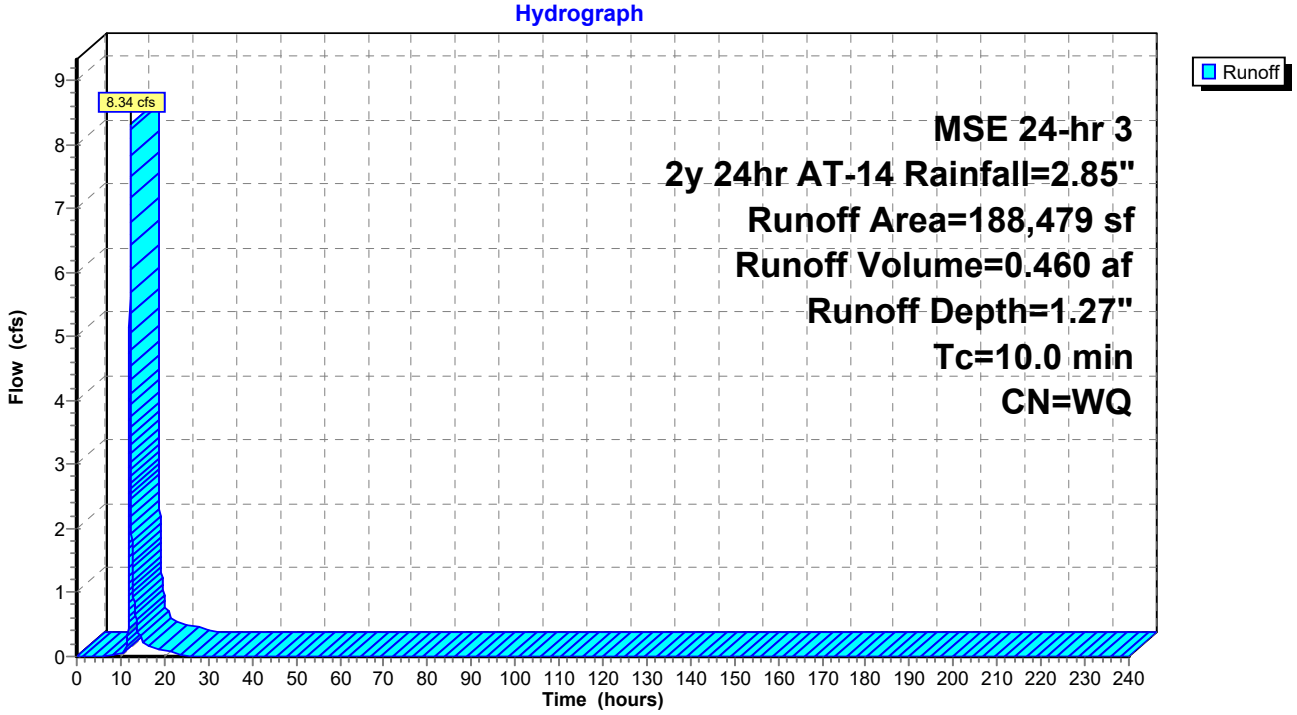
Runoff = 8.34 cfs @ 12.18 hrs, Volume= 0.460 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.85"

Area (sf)	CN	Description
17,318	98	Paved parking, HSG D
171,161	80	>75% Grass cover, Good, HSG D
188,479		Weighted Average
171,161		90.81% Pervious Area
17,318		9.19% Impervious Area

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

Subcatchment PR1C: PR1C - DRAINS TO WETLAND - UNTREATED



Summary for Subcatchment PR2: PR2 - DRAINS NORTH TO HIGHWAY 5 - UNTREATED

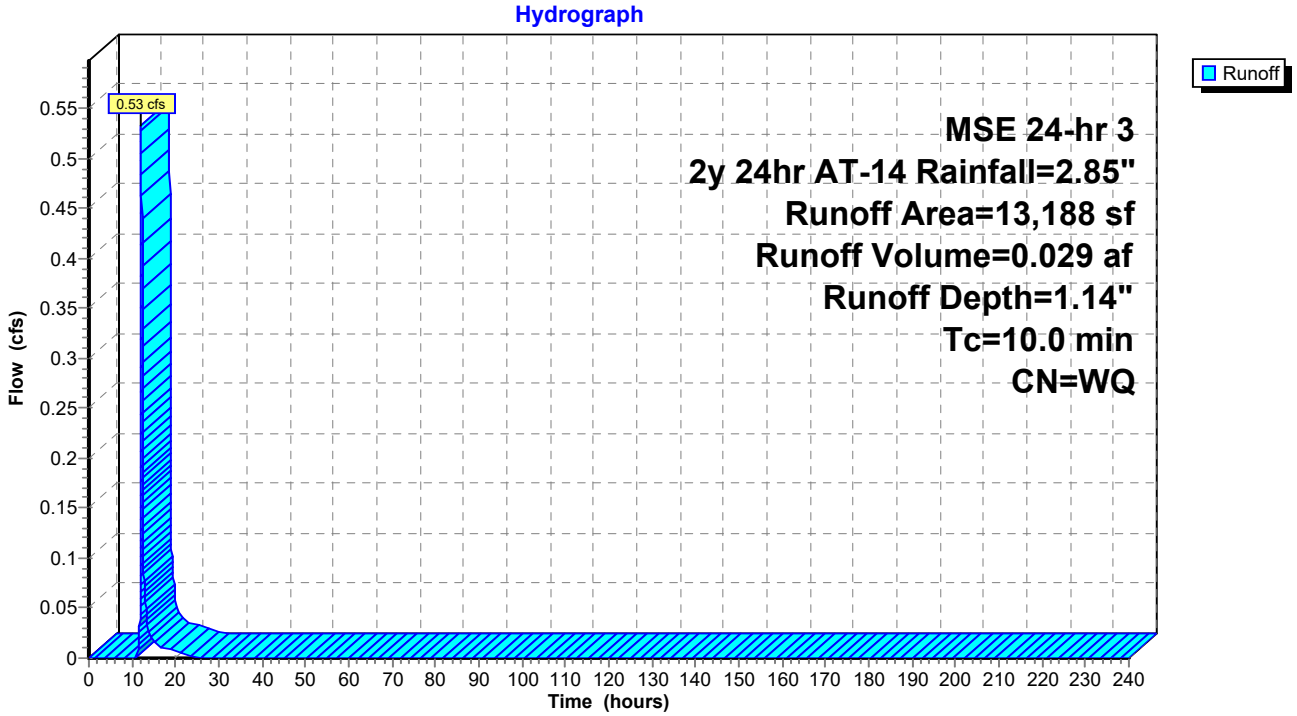
Runoff = 0.53 cfs @ 12.18 hrs, Volume= 0.029 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.85"

Area (sf)	CN	Description
0	98	Paved parking, HSG D
13,188	80	>75% Grass cover, Good, HSG D
13,188		Weighted Average
13,188		100.00% Pervious Area

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

Subcatchment PR2: PR2 - DRAINS NORTH TO HIGHWAY 5 - UNTREATED



Summary for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Inflow Area = 3.486 ac, 79.78% Impervious, Inflow Depth = 2.32" for 2y 24hr AT-14 event
Inflow = 11.23 cfs @ 12.17 hrs, Volume= 0.674 af
Outflow = 0.34 cfs @ 10.77 hrs, Volume= 0.674 af, Atten= 97%, Lag= 0.0 min
Primary = 0.34 cfs @ 10.77 hrs, Volume= 0.674 af

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Peak Elev= 951.67' @ 14.20 hrs Surf.Area= 10,324 sf Storage= 17,895 cf

Plug-Flow detention time= 465.1 min calculated for 0.674 af (100% of inflow)
Center-of-Mass det. time= 465.1 min (1,229.1 - 764.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	949.25'	11,678 cf	**44.50'W x 232.00'L x 5.50'H Field A** 56,782 cf Overall - 27,587 cf Embedded = 29,195 cf x 40.0% Voids
#2A	949.25'	27,587 cf	**CMP Round 60** x 66 Inside #1 Effective Size= 60.0"W x 60.0"H => 19.63 sf x 20.00'L = 392.7 cf Overall Size= 60.0"W x 60.0"H x 20.00'L 66 Chambers in 6 Rows 42.50' Header x 19.63 sf x 2 = 1,669.0 cf Inside
		39,265 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	947.25'	**18.0" Round Culvert** L= 290.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 947.25' / 945.00' S= 0.0078 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#2	Device 1	952.10'	**2.1' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	949.25'	**0.340 cfs Constant Flow/Skimmer**

Primary OutFlow Max=0.34 cfs @ 10.77 hrs HW=949.30' (Free Discharge)
└─**1=Culvert** (Passes 0.34 cfs of 8.56 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └─**3=Constant Flow/Skimmer** (Constant Controls 0.34 cfs)

Pond 1P: UNDERGROUND RATE CONTROL BASIN 1 - Chamber Wizard Field A

Chamber Model = CMP Round 60 (Round Corrugated Metal Pipe)
Effective Size= 60.0"W x 60.0"H => 19.63 sf x 20.00'L = 392.7 cf
Overall Size= 60.0"W x 60.0"H x 20.00'L

60.0" Wide + 30.0" Spacing = 90.0" C-C Row Spacing

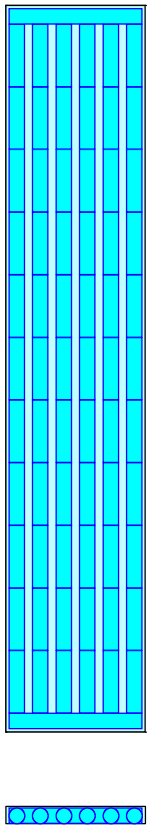
11 Chambers/Row x 20.00' Long +5.00' Header x 2 = 230.00' Row Length +12.0" End Stone x 2 = 232.00' Base Length
6 Rows x 60.0" Wide + 30.0" Spacing x 5 + 12.0" Side Stone x 2 = 44.50' Base Width
60.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

66 Chambers x 392.7 cf + 42.50' Header x 19.63 sf x 2 = 27,587.1 cf Chamber Storage

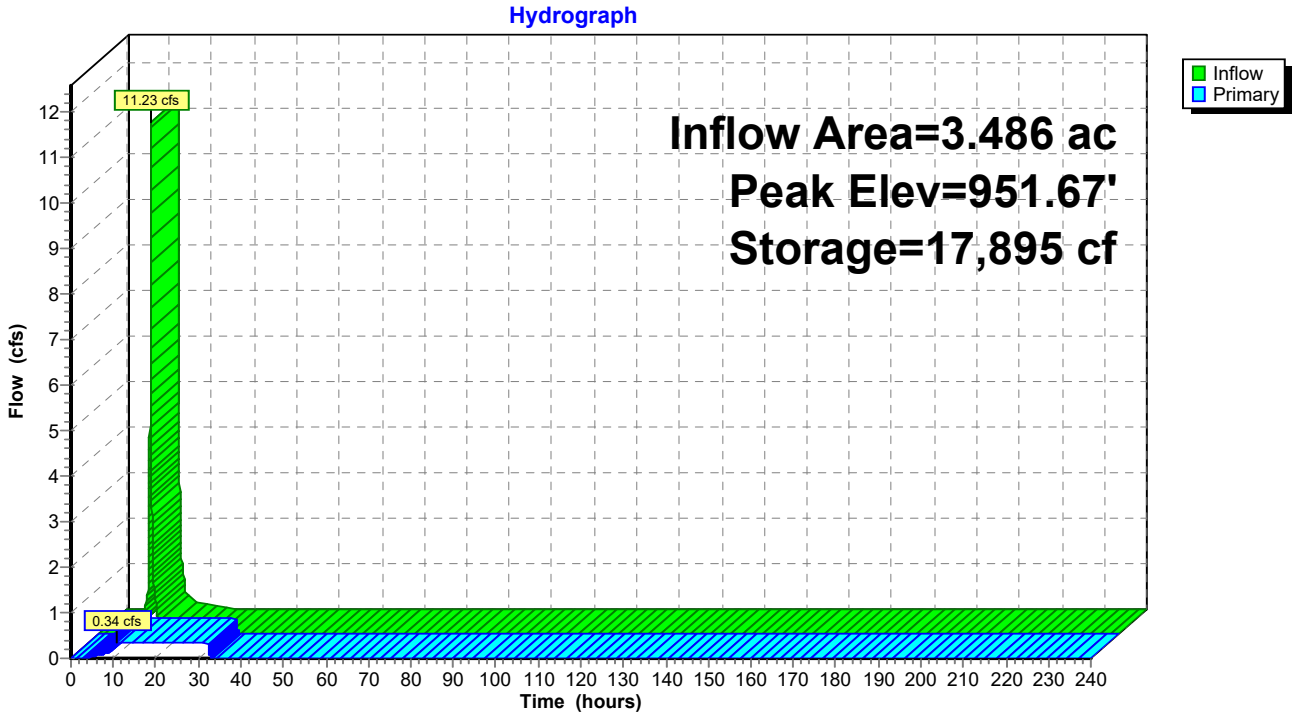
56,782.0 cf Field - 27,587.1 cf Chambers = 29,194.9 cf Stone x 40.0% Voids = 11,678.0 cf Stone Storage

Chamber Storage + Stone Storage = 39,265.1 cf = 0.901 af
Overall Storage Efficiency = 69.2%
Overall System Size = 232.00' x 44.50' x 5.50'

66 Chambers
2,103.0 cy Field
1,081.3 cy Stone



Pond 1P: UNDERGROUND RATE CONTROL BASIN 1



Stage-Discharge for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
949.25	0.00	951.85	0.34	954.45	16.03
949.30	0.34	951.90	0.34	954.50	16.08
949.35	0.34	951.95	0.34	954.55	16.13
949.40	0.34	952.00	0.34	954.60	16.18
949.45	0.34	952.05	0.34	954.65	16.23
949.50	0.34	952.10	0.34	954.70	16.28
949.55	0.34	952.15	0.42	954.75	**16.33**
949.60	0.34	952.20	0.56		
949.65	0.34	952.25	0.73		
949.70	0.34	952.30	0.94		
949.75	0.34	952.35	1.18		
949.80	0.34	952.40	1.44		
949.85	0.34	952.45	1.71		
949.90	0.34	952.50	2.01		
949.95	0.34	952.55	2.32		
950.00	0.34	952.60	2.65		
950.05	0.34	952.65	2.99		
950.10	0.34	952.70	3.35		
950.15	0.34	952.75	3.72		
950.20	0.34	952.80	4.09		
950.25	0.34	952.85	4.48		
950.30	0.34	952.90	4.88		
950.35	0.34	952.95	5.29		
950.40	0.34	953.00	5.70		
950.45	0.34	953.05	6.12		
950.50	0.34	953.10	6.55		
950.55	0.34	953.15	6.99		
950.60	0.34	953.20	7.43		
950.65	0.34	953.25	7.88		
950.70	0.34	953.30	8.34		
950.75	0.34	953.35	8.79		
950.80	0.34	953.40	9.26		
950.85	0.34	953.45	9.73		
950.90	0.34	953.50	10.20		
950.95	0.34	953.55	10.67		
951.00	0.34	953.60	11.15		
951.05	0.34	953.65	11.64		
951.10	0.34	953.70	12.12		
951.15	0.34	953.75	12.61		
951.20	0.34	953.80	13.10		
951.25	0.34	953.85	13.59		
951.30	0.34	953.90	14.08		
951.35	0.34	953.95	14.57		
951.40	0.34	954.00	15.07		
951.45	0.34	954.05	15.57		
951.50	0.34	954.10	15.68		
951.55	0.34	954.15	15.73		
951.60	0.34	954.20	15.78		
951.65	0.34	954.25	15.83		
951.70	0.34	954.30	15.88		
951.75	0.34	954.35	15.93		
951.80	0.34	954.40	15.98		

Stage-Area-Storage for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
949.25	0	951.85	19,434	954.45	38,026
949.30	227	951.90	19,851	954.50	38,233
949.35	492	951.95	20,268	954.55	38,439
949.40	764	952.00	20,685	954.60	38,646
949.45	1,048	952.05	21,100	954.65	38,852
949.50	1,342	952.10	21,516	954.70	39,059
949.55	1,644	952.15	21,931	954.75	**39,265**
949.60	1,955	952.20	22,345		
949.65	2,272	952.25	22,758		
949.70	2,596	952.30	23,171		
949.75	2,926	952.35	23,582		
949.80	3,262	952.40	23,993		
949.85	3,603	952.45	24,402		
949.90	3,949	952.50	24,811		
949.95	4,299	952.55	25,217		
950.00	4,654	952.60	25,623		
950.05	5,013	952.65	26,027		
950.10	5,376	952.70	26,429		
950.15	5,743	952.75	26,829		
950.20	6,113	952.80	27,228		
950.25	6,486	952.85	27,625		
950.30	6,863	952.90	28,020		
950.35	7,243	952.95	28,412		
950.40	7,625	953.00	28,802		
950.45	8,010	953.05	29,190		
950.50	8,398	953.10	29,575		
950.55	8,788	953.15	29,958		
950.60	9,181	953.20	30,337		
950.65	9,575	953.25	30,714		
950.70	9,972	953.30	31,087		
950.75	10,371	953.35	31,458		
950.80	10,771	953.40	31,824		
950.85	11,174	953.45	32,187		
950.90	11,577	953.50	32,546		
950.95	11,983	953.55	32,901		
951.00	12,390	953.60	33,252		
951.05	12,798	953.65	33,597		
951.10	13,207	953.70	33,938		
951.15	13,618	953.75	34,274		
951.20	14,029	953.80	34,604		
951.25	14,442	953.85	34,928		
951.30	14,855	953.90	35,246		
951.35	15,270	953.95	35,556		
951.40	15,684	954.00	35,858		
951.45	16,100	954.05	36,152		
951.50	16,516	954.10	36,436		
951.55	16,932	954.15	36,708		
951.60	17,349	954.20	36,966		
951.65	17,766	954.25	37,200		
951.70	18,183	954.30	37,407		
951.75	18,600	954.35	37,613		
951.80	19,017	954.40	37,820		

Summary for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Inflow Area =	0.297 ac, 77.23% Impervious, Inflow Depth = 2.28" for 2y 24hr AT-14 event				
Inflow =	0.94 cfs @	12.17 hrs,	Volume=	0.057 af	
Outflow =	0.06 cfs @	13.32 hrs,	Volume=	0.057 af,	Atten= 93%, Lag= 68.9 min
Primary =	0.06 cfs @	13.32 hrs,	Volume=	0.057 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Peak Elev= 949.35' @ 13.32 hrs Surf.Area= 1,677 sf Storage= 1,246 cf

Plug-Flow detention time= 176.5 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 176.4 min (941.3 - 764.9)

Volume	Invert	Avail.Storage	Storage Description
#1	948.50'	3,519 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

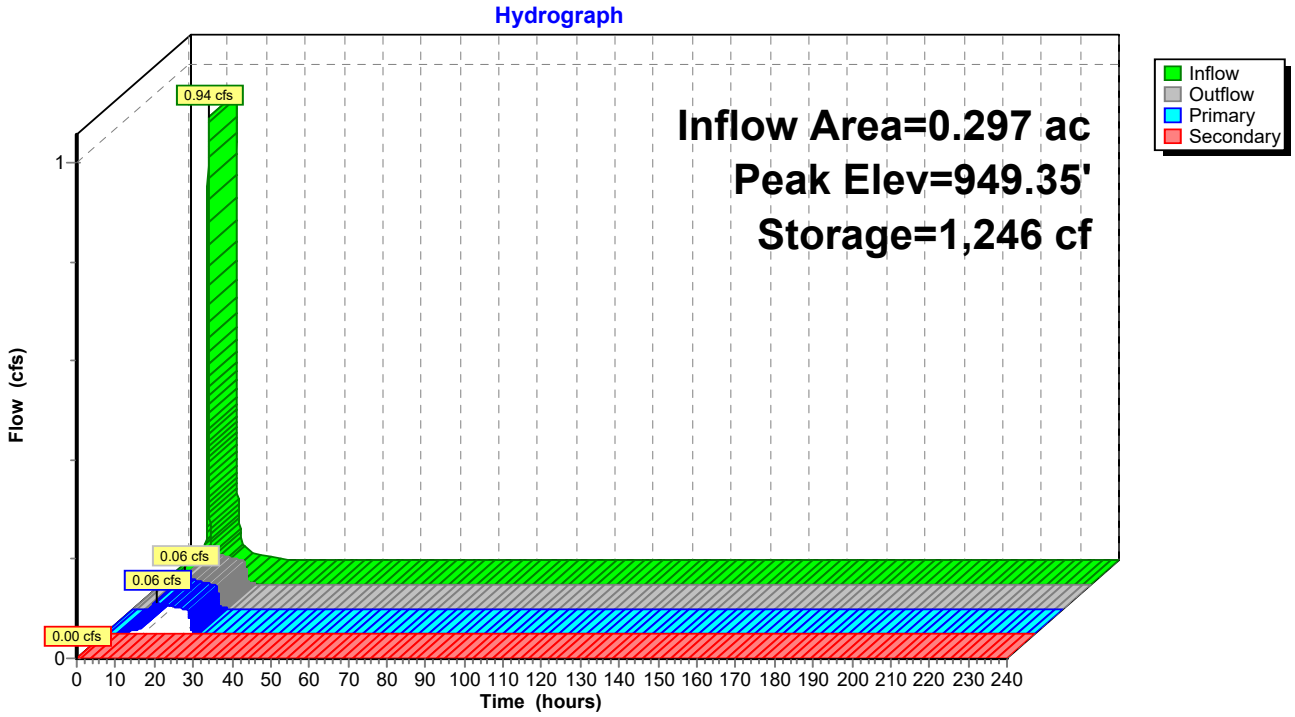
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.50	1,261	0	0
949.00	1,497	690	690
950.00	2,011	1,754	2,444
950.50	2,290	1,075	3,519

Device	Routing	Invert	Outlet Devices
#1	Primary	946.50'	**12.0" Round Culvert** L= 20.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 946.50' / 946.00' S= 0.0250 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	949.80'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	948.50'	**1.600 in/hr Exfiltration over Surface area**
#4	Secondary	950.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.06 cfs @ 13.32 hrs HW=949.35' (Free Discharge)
└─**1=Culvert** (Passes 0.06 cfs of 5.12 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Exfiltration** (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=948.50' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: ABOVEGROUND FILTRATION BASIN 2



Stage-Discharge for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
948.50	0.00	0.00	0.00
948.52	0.05	0.05	0.00
948.54	0.05	0.05	0.00
948.56	0.05	0.05	0.00
948.58	0.05	0.05	0.00
948.60	0.05	0.05	0.00
948.62	0.05	0.05	0.00
948.64	0.05	0.05	0.00
948.66	0.05	0.05	0.00
948.68	0.05	0.05	0.00
948.70	0.05	0.05	0.00
948.72	0.05	0.05	0.00
948.74	0.05	0.05	0.00
948.76	0.05	0.05	0.00
948.78	0.05	0.05	0.00
948.80	0.05	0.05	0.00
948.82	0.05	0.05	0.00
948.84	0.05	0.05	0.00
948.86	0.05	0.05	0.00
948.88	0.05	0.05	0.00
948.90	0.05	0.05	0.00
948.92	0.05	0.05	0.00
948.94	0.05	0.05	0.00
948.96	0.05	0.05	0.00
948.98	0.06	0.06	0.00
949.00	0.06	0.06	0.00
949.02	0.06	0.06	0.00
949.04	0.06	0.06	0.00
949.06	0.06	0.06	0.00
949.08	0.06	0.06	0.00
949.10	0.06	0.06	0.00
949.12	0.06	0.06	0.00
949.14	0.06	0.06	0.00
949.16	0.06	0.06	0.00
949.18	0.06	0.06	0.00
949.20	0.06	0.06	0.00
949.22	0.06	0.06	0.00
949.24	0.06	0.06	0.00
949.26	0.06	0.06	0.00
949.28	0.06	0.06	0.00
949.30	0.06	0.06	0.00
949.32	0.06	0.06	0.00
949.34	0.06	0.06	0.00
949.36	0.06	0.06	0.00
949.38	0.06	0.06	0.00
949.40	0.06	0.06	0.00
949.42	0.06	0.06	0.00
949.44	0.06	0.06	0.00
949.46	0.06	0.06	0.00
949.48	0.06	0.06	0.00
949.50	0.06	0.06	0.00
949.52	0.07	0.07	0.00
949.54	0.07	0.07	0.00
949.56	0.07	0.07	0.00
949.58	0.07	0.07	0.00
949.60	0.07	0.07	0.00
949.62	0.07	0.07	0.00
949.64	0.07	0.07	0.00
949.66	0.07	0.07	0.00
949.68	0.07	0.07	0.00
949.70	0.07	0.07	0.00
949.72	0.07	0.07	0.00
949.74	0.07	0.07	0.00
949.76	0.07	0.07	0.00
949.78	0.07	0.07	0.00
949.80	0.07	0.07	0.00
949.82	0.10	0.10	0.00
949.84	0.15	0.15	0.00
949.86	0.22	0.22	0.00
949.88	0.30	0.30	0.00
949.90	0.40	0.40	0.00
949.92	0.50	0.50	0.00
949.94	0.61	0.61	0.00
949.96	0.73	0.73	0.00
949.98	0.86	0.86	0.00
950.00	0.99	0.99	0.00
950.02	1.19	1.13	0.05
950.04	1.44	1.28	0.15
950.06	1.72	1.44	0.28
950.08	2.03	1.60	0.43
950.10	2.37	1.76	0.60
950.12	2.73	1.94	0.79
950.14	3.11	2.11	1.00
950.16	3.52	2.30	1.22
950.18	3.86	2.41	1.45
950.20	4.17	2.47	1.70
950.22	4.51	2.53	1.98
950.24	4.86	2.59	2.27
950.26	5.22	2.64	2.58
950.28	5.60	2.70	2.90
950.30	5.99	2.75	3.23
950.32	6.39	2.81	3.59
950.34	6.81	2.86	3.95
950.36	7.25	2.91	4.33
950.38	7.69	2.96	4.73
950.40	8.15	3.01	5.14
950.42	8.62	3.06	5.56
950.44	9.11	3.11	6.00
950.46	9.61	3.16	6.45
950.48	10.12	3.20	6.92
950.50	**10.65**	**3.25**	**7.40**

Stage-Area-Storage for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
948.50	1,261	0
948.52	1,270	25
948.54	1,280	51
948.56	1,289	77
948.58	1,299	102
948.60	1,308	128
948.62	1,318	155
948.64	1,327	181
948.66	1,337	208
948.68	1,346	235
948.70	1,355	262
948.72	1,365	289
948.74	1,374	316
948.76	1,384	344
948.78	1,393	372
948.80	1,403	400
948.82	1,412	428
948.84	1,421	456
948.86	1,431	485
948.88	1,440	513
948.90	1,450	542
948.92	1,459	571
948.94	1,469	601
948.96	1,478	630
948.98	1,488	660
949.00	1,497	690
949.02	1,507	720
949.04	1,518	750
949.06	1,528	780
949.08	1,538	811
949.10	1,548	842
949.12	1,559	873
949.14	1,569	904
949.16	1,579	936
949.18	1,590	967
949.20	1,600	999
949.22	1,610	1,031
949.24	1,620	1,064
949.26	1,631	1,096
949.28	1,641	1,129
949.30	1,651	1,162
949.32	1,661	1,195
949.34	1,672	1,228
949.36	1,682	1,262
949.38	1,692	1,295
949.40	1,703	1,329
949.42	1,713	1,364
949.44	1,723	1,398
949.46	1,733	1,433
949.48	1,744	1,467
949.50	1,754	1,502
949.52	1,764	1,537
949.54	1,775	1,573
949.56	1,785	1,608
949.58	1,795	1,644
949.60	1,805	1,680
949.62	1,816	1,716
949.64	1,826	1,753
949.66	1,836	1,789
949.68	1,847	1,826
949.70	1,857	1,863
949.72	1,867	1,901
949.74	1,877	1,938
949.76	1,888	1,976
949.78	1,898	2,014
949.80	1,908	2,052
949.82	1,918	2,090
949.84	1,929	2,128
949.86	1,939	2,167
949.88	1,949	2,206
949.90	1,960	2,245
949.92	1,970	2,284
949.94	1,980	2,324
949.96	1,990	2,363
949.98	2,001	2,403
950.00	2,011	2,444
950.02	2,022	2,484
950.04	2,033	2,524
950.06	2,044	2,565
950.08	2,056	2,606
950.10	2,067	2,647
950.12	2,078	2,689
950.14	2,089	2,731
950.16	2,100	2,772
950.18	2,111	2,815
950.20	2,123	2,857
950.22	2,134	2,899
950.24	2,145	2,942
950.26	2,156	2,985
950.28	2,167	3,028
950.30	2,178	3,072
950.32	2,190	3,116
950.34	2,201	3,159
950.36	2,212	3,204
950.38	2,223	3,248
950.40	2,234	3,293
950.42	2,245	3,337
950.44	2,257	3,382
950.46	2,268	3,428
950.48	2,279	3,473
950.50	**2,290**	**3,519**

Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment PR1A: PR1A - DRAINS TO Runoff Area=151,857 sf 79.78% Impervious Runoff Depth=3.63"
Tc=10.0 min CN=WQ Runoff=17.36 cfs 1.054 af

Subcatchment PR1B: PR1B - DRAINS TO Runoff Area=12,953 sf 77.23% Impervious Runoff Depth=3.58"
Tc=10.0 min CN=WQ Runoff=1.47 cfs 0.089 af

Subcatchment PR1C: PR1C - DRAINS TO Runoff Area=188,479 sf 9.19% Impervious Runoff Depth=2.39"
Tc=10.0 min CN=WQ Runoff=15.74 cfs 0.861 af

Subcatchment PR2: PR2 - DRAINS NORTH Runoff Area=13,188 sf 0.00% Impervious Runoff Depth=2.22"
Tc=10.0 min CN=WQ Runoff=1.05 cfs 0.056 af

Pond 1P: UNDERGROUND RATE Peak Elev=952.52' Storage=24,990 cf Inflow=17.36 cfs 1.054 af
Outflow=2.15 cfs 1.054 af

Pond 2P: ABOVEGROUND FILTRATION Peak Elev=949.82' Storage=2,099 cf Inflow=1.47 cfs 0.089 af
Primary=0.11 cfs 0.089 af Secondary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.089 af

Total Runoff Area = 8.413 ac Runoff Volume = 2.060 af Average Runoff Depth = 2.94"
59.49% Pervious = 5.005 ac 40.51% Impervious = 3.409 ac

ry for Subcatchment PR1A: PR1A - DRAINS TO UNDERGROUND FILTRATION BASIN 1 THEN SOUTH T

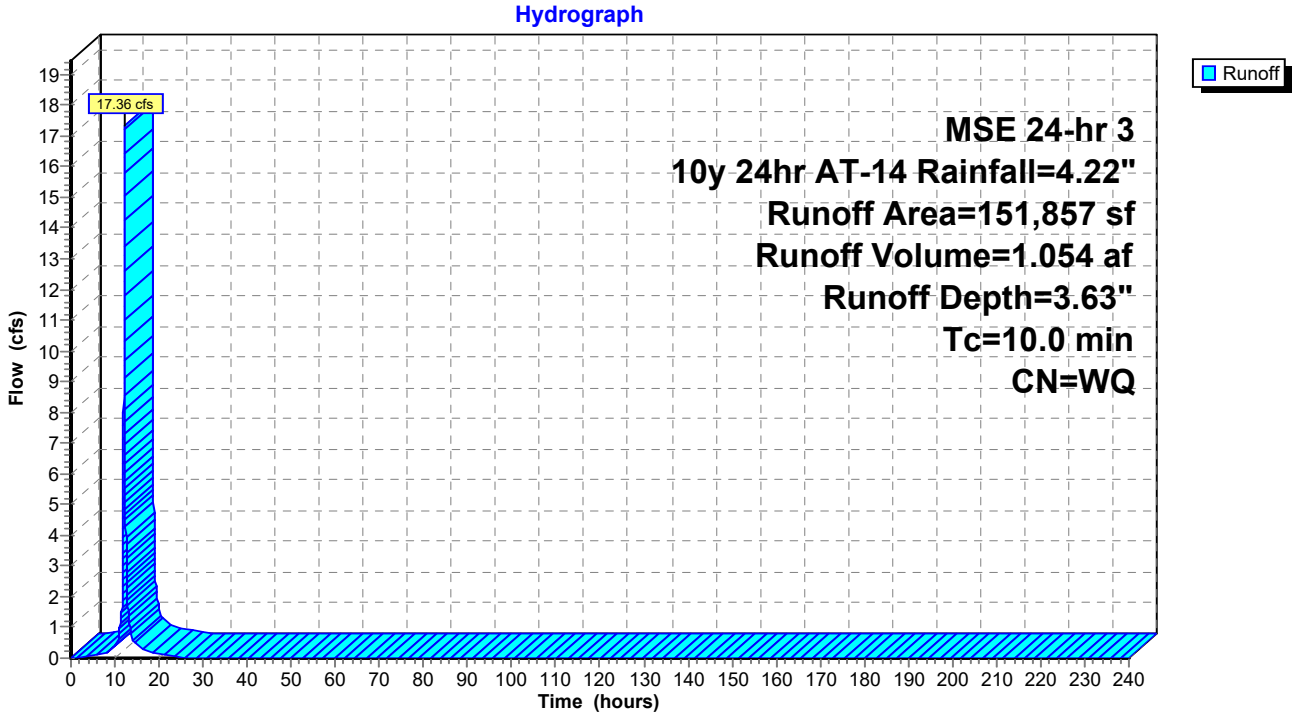
Runoff = 17.36 cfs @ 12.17 hrs, Volume= 1.054 af, Depth= 3.63"
Routed to Pond 1P : UNDERGROUND RATE CONTROL BASIN 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.22"

Area (sf)	CN	Description
121,156	98	Paved parking, HSG D
30,701	80	>75% Grass cover, Good, HSG D
151,857		Weighted Average
30,701		20.22% Pervious Area
121,156		79.78% Impervious Area

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

ubcatchment PR1A: PR1A - DRAINS TO UNDERGROUND FILTRATION BASIN 1 THEN SOUTH TO WETL



ry for Subcatchment PR1B: PR1B - DRAINS TO ABOVEGROUND FILTRATION BASIN 2 THEN SOUTH T

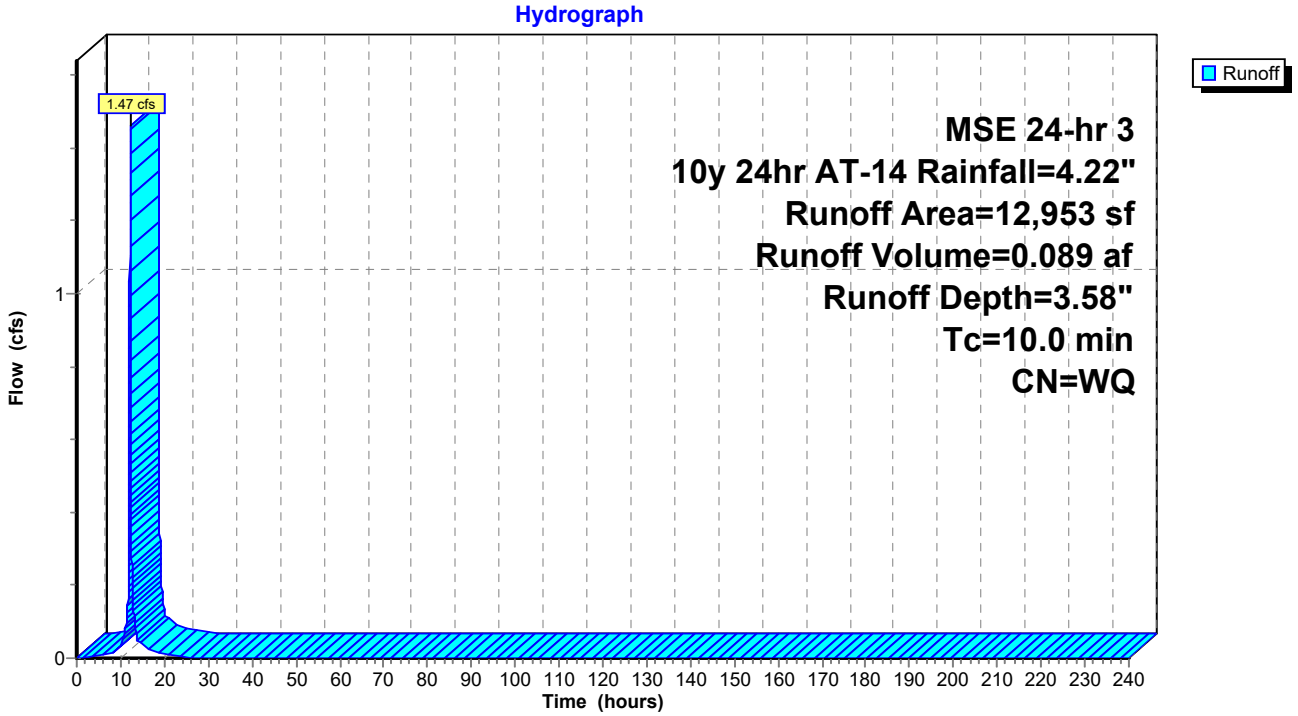
Runoff = 1.47 cfs @ 12.17 hrs, Volume= 0.089 af, Depth= 3.58"
Routed to Pond 2P : ABOVEGROUND FILTRATION BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.22"

Area (sf)	CN	Description
10,004	98	Paved parking, HSG D
2,949	80	>75% Grass cover, Good, HSG D
12,953		Weighted Average
2,949		22.77% Pervious Area
10,004		77.23% Impervious Area

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

ubcatchment PR1B: PR1B - DRAINS TO ABOVEGROUND FILTRATION BASIN 2 THEN SOUTH TO WETI



Summary for Subcatchment PR1C: PR1C - DRAINS TO WETLAND - UNTREATED

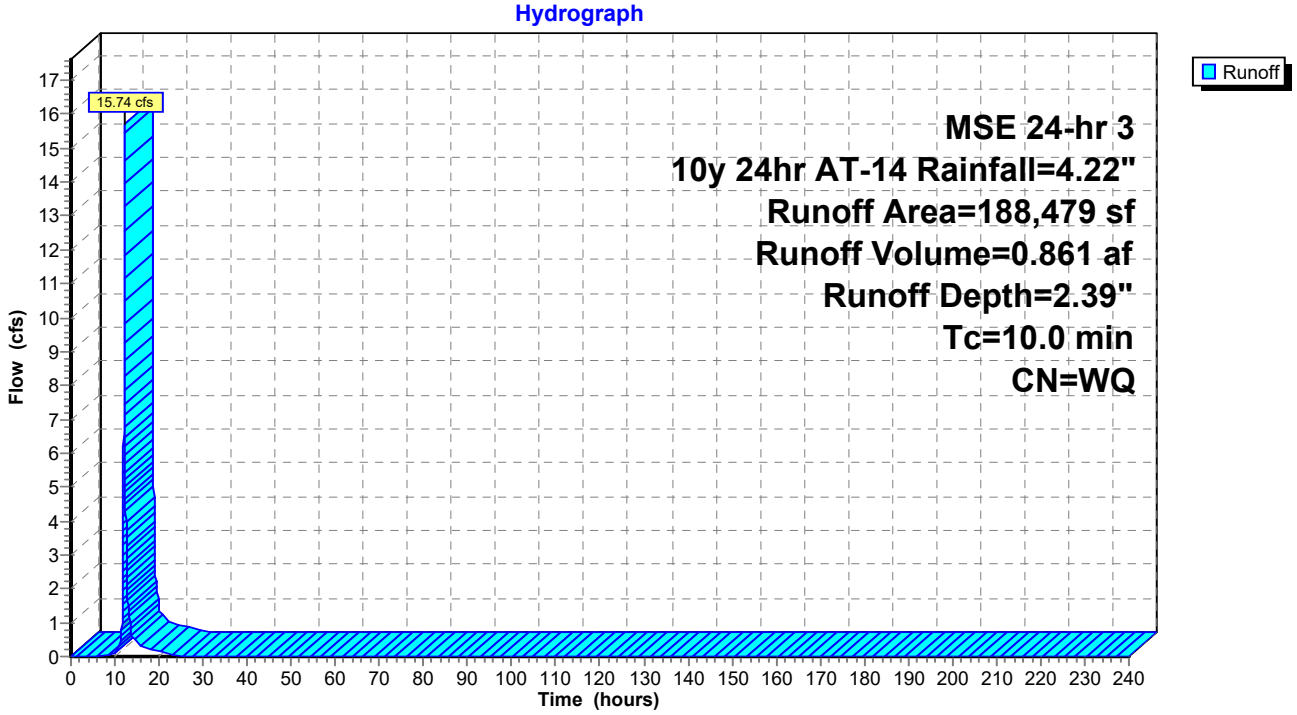
Runoff = 15.74 cfs @ 12.18 hrs, Volume= 0.861 af, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.22"

Area (sf)	CN	Description
17,318	98	Paved parking, HSG D
171,161	80	>75% Grass cover, Good, HSG D
188,479		Weighted Average
171,161		90.81% Pervious Area
17,318		9.19% Impervious Area

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

Subcatchment PR1C: PR1C - DRAINS TO WETLAND - UNTREATED



Summary for Subcatchment PR2: PR2 - DRAINS NORTH TO HIGHWAY 5 - UNTREATED

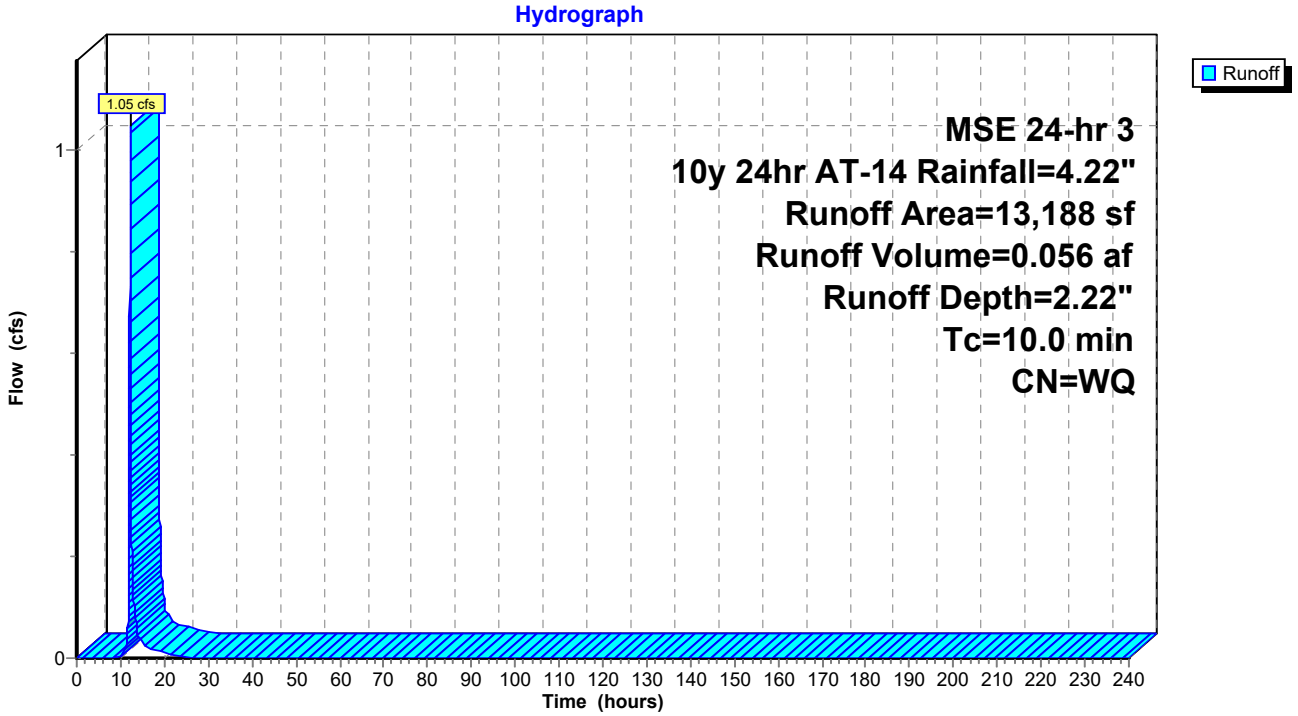
Runoff = 1.05 cfs @ 12.18 hrs, Volume= 0.056 af, Depth= 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.22"

Area (sf)	CN	Description
0	98	Paved parking, HSG D
13,188	80	>75% Grass cover, Good, HSG D
13,188		Weighted Average
13,188		100.00% Pervious Area

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

Subcatchment PR2: PR2 - DRAINS NORTH TO HIGHWAY 5 - UNTREATED



Summary for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Inflow Area = 3.486 ac, 79.78% Impervious, Inflow Depth = 3.63" for 10y 24hr AT-14 event
Inflow = 17.36 cfs @ 12.17 hrs, Volume= 1.054 af
Outflow = 2.15 cfs @ 12.67 hrs, Volume= 1.054 af, Atten= 88%, Lag= 29.7 min
Primary = 2.15 cfs @ 12.67 hrs, Volume= 1.054 af

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Peak Elev= 952.52' @ 12.67 hrs Surf.Area= 10,324 sf Storage= 24,990 cf

Plug-Flow detention time= 471.5 min calculated for 1.054 af (100% of inflow)
Center-of-Mass det. time= 471.5 min (1,229.8 - 758.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	949.25'	11,678 cf	**44.50'W x 232.00'L x 5.50'H Field A** 56,782 cf Overall - 27,587 cf Embedded = 29,195 cf x 40.0% Voids
#2A	949.25'	27,587 cf	**CMP Round 60** x 66 Inside #1 Effective Size= 60.0"W x 60.0"H => 19.63 sf x 20.00'L = 392.7 cf Overall Size= 60.0"W x 60.0"H x 20.00'L 66 Chambers in 6 Rows 42.50' Header x 19.63 sf x 2 = 1,669.0 cf Inside
		39,265 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	947.25'	**18.0" Round Culvert** L= 290.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 947.25' / 945.00' S= 0.0078 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#2	Device 1	952.10'	**2.1' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	949.25'	**0.340 cfs Constant Flow/Skimmer**

Primary OutFlow Max=2.15 cfs @ 12.67 hrs HW=952.52' (Free Discharge)
└─**1=Culvert** (Passes 2.15 cfs of 13.95 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.81 cfs @ 2.12 fps)
  └─**3=Constant Flow/Skimmer** (Constant Controls 0.34 cfs)

Pond 1P: UNDERGROUND RATE CONTROL BASIN 1 - Chamber Wizard Field A

Chamber Model = CMP Round 60 (Round Corrugated Metal Pipe)
Effective Size= 60.0"W x 60.0"H => 19.63 sf x 20.00'L = 392.7 cf
Overall Size= 60.0"W x 60.0"H x 20.00'L

60.0" Wide + 30.0" Spacing = 90.0" C-C Row Spacing

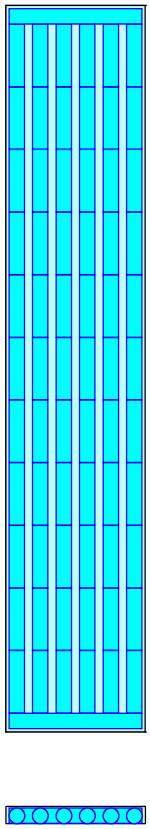
11 Chambers/Row x 20.00' Long +5.00' Header x 2 = 230.00' Row Length +12.0" End Stone x 2 = 232.00' Base Length
6 Rows x 60.0" Wide + 30.0" Spacing x 5 + 12.0" Side Stone x 2 = 44.50' Base Width
60.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

66 Chambers x 392.7 cf + 42.50' Header x 19.63 sf x 2 = 27,587.1 cf Chamber Storage

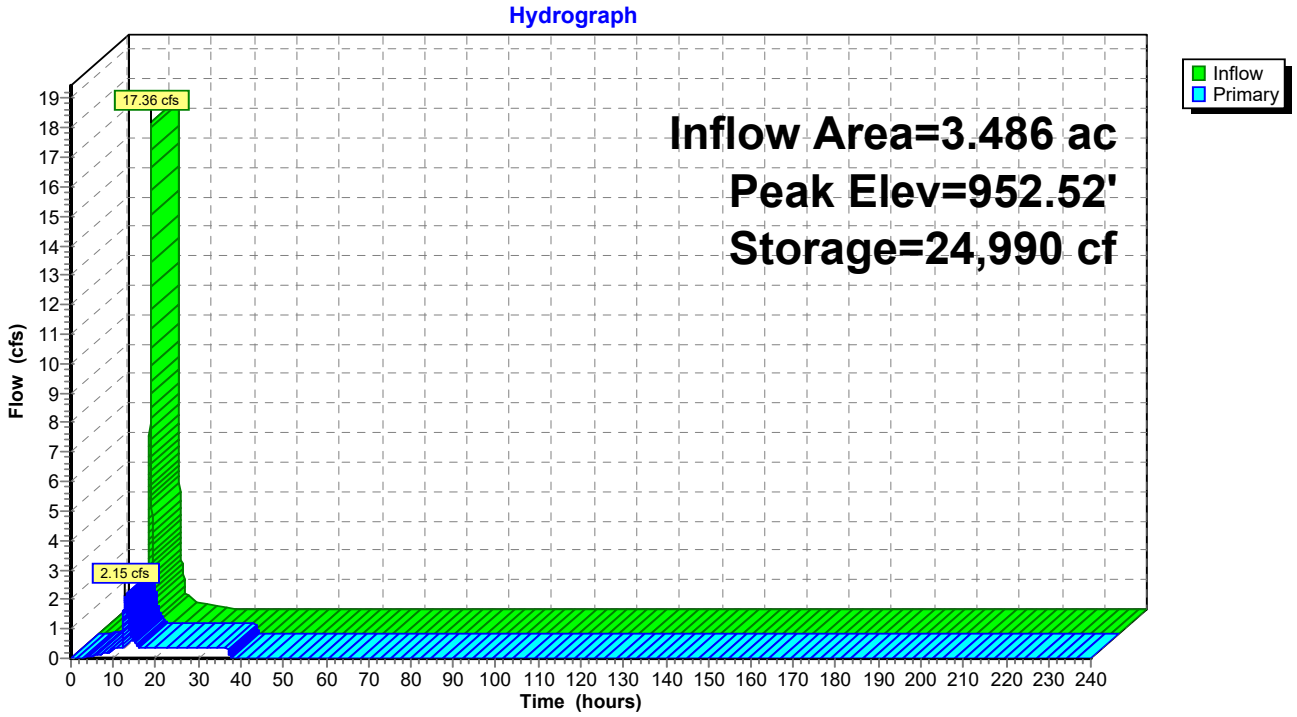
56,782.0 cf Field - 27,587.1 cf Chambers = 29,194.9 cf Stone x 40.0% Voids = 11,678.0 cf Stone Storage

Chamber Storage + Stone Storage = 39,265.1 cf = 0.901 af
Overall Storage Efficiency = 69.2%
Overall System Size = 232.00' x 44.50' x 5.50'

66 Chambers
2,103.0 cy Field
1,081.3 cy Stone



Pond 1P: UNDERGROUND RATE CONTROL BASIN 1



Stage-Discharge for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
949.25	0.00	951.85	0.34	954.45	16.03
949.30	0.34	951.90	0.34	954.50	16.08
949.35	0.34	951.95	0.34	954.55	16.13
949.40	0.34	952.00	0.34	954.60	16.18
949.45	0.34	952.05	0.34	954.65	16.23
949.50	0.34	952.10	0.34	954.70	16.28
949.55	0.34	952.15	0.42	954.75	**16.33**
949.60	0.34	952.20	0.56		
949.65	0.34	952.25	0.73		
949.70	0.34	952.30	0.94		
949.75	0.34	952.35	1.18		
949.80	0.34	952.40	1.44		
949.85	0.34	952.45	1.71		
949.90	0.34	952.50	2.01		
949.95	0.34	952.55	2.32		
950.00	0.34	952.60	2.65		
950.05	0.34	952.65	2.99		
950.10	0.34	952.70	3.35		
950.15	0.34	952.75	3.72		
950.20	0.34	952.80	4.09		
950.25	0.34	952.85	4.48		
950.30	0.34	952.90	4.88		
950.35	0.34	952.95	5.29		
950.40	0.34	953.00	5.70		
950.45	0.34	953.05	6.12		
950.50	0.34	953.10	6.55		
950.55	0.34	953.15	6.99		
950.60	0.34	953.20	7.43		
950.65	0.34	953.25	7.88		
950.70	0.34	953.30	8.34		
950.75	0.34	953.35	8.79		
950.80	0.34	953.40	9.26		
950.85	0.34	953.45	9.73		
950.90	0.34	953.50	10.20		
950.95	0.34	953.55	10.67		
951.00	0.34	953.60	11.15		
951.05	0.34	953.65	11.64		
951.10	0.34	953.70	12.12		
951.15	0.34	953.75	12.61		
951.20	0.34	953.80	13.10		
951.25	0.34	953.85	13.59		
951.30	0.34	953.90	14.08		
951.35	0.34	953.95	14.57		
951.40	0.34	954.00	15.07		
951.45	0.34	954.05	15.57		
951.50	0.34	954.10	15.68		
951.55	0.34	954.15	15.73		
951.60	0.34	954.20	15.78		
951.65	0.34	954.25	15.83		
951.70	0.34	954.30	15.88		
951.75	0.34	954.35	15.93		
951.80	0.34	954.40	15.98		

Stage-Area-Storage for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
949.25	0	951.85	19,434	954.45	38,026
949.30	227	951.90	19,851	954.50	38,233
949.35	492	951.95	20,268	954.55	38,439
949.40	764	952.00	20,685	954.60	38,646
949.45	1,048	952.05	21,100	954.65	38,852
949.50	1,342	952.10	21,516	954.70	39,059
949.55	1,644	952.15	21,931	954.75	**39,265**
949.60	1,955	952.20	22,345		
949.65	2,272	952.25	22,758		
949.70	2,596	952.30	23,171		
949.75	2,926	952.35	23,582		
949.80	3,262	952.40	23,993		
949.85	3,603	952.45	24,402		
949.90	3,949	952.50	24,811		
949.95	4,299	952.55	25,217		
950.00	4,654	952.60	25,623		
950.05	5,013	952.65	26,027		
950.10	5,376	952.70	26,429		
950.15	5,743	952.75	26,829		
950.20	6,113	952.80	27,228		
950.25	6,486	952.85	27,625		
950.30	6,863	952.90	28,020		
950.35	7,243	952.95	28,412		
950.40	7,625	953.00	28,802		
950.45	8,010	953.05	29,190		
950.50	8,398	953.10	29,575		
950.55	8,788	953.15	29,958		
950.60	9,181	953.20	30,337		
950.65	9,575	953.25	30,714		
950.70	9,972	953.30	31,087		
950.75	10,371	953.35	31,458		
950.80	10,771	953.40	31,824		
950.85	11,174	953.45	32,187		
950.90	11,577	953.50	32,546		
950.95	11,983	953.55	32,901		
951.00	12,390	953.60	33,252		
951.05	12,798	953.65	33,597		
951.10	13,207	953.70	33,938		
951.15	13,618	953.75	34,274		
951.20	14,029	953.80	34,604		
951.25	14,442	953.85	34,928		
951.30	14,855	953.90	35,246		
951.35	15,270	953.95	35,556		
951.40	15,684	954.00	35,858		
951.45	16,100	954.05	36,152		
951.50	16,516	954.10	36,436		
951.55	16,932	954.15	36,708		
951.60	17,349	954.20	36,966		
951.65	17,766	954.25	37,200		
951.70	18,183	954.30	37,407		
951.75	18,600	954.35	37,613		
951.80	19,017	954.40	37,820		

Summary for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Inflow Area =	0.297 ac, 77.23% Impervious, Inflow Depth = 3.58" for 10y 24hr AT-14 event				
Inflow =	1.47 cfs @	12.17 hrs,	Volume=	0.089 af	
Outflow =	0.11 cfs @	13.12 hrs,	Volume=	0.089 af,	Atten= 92%, Lag= 56.8 min
Primary =	0.11 cfs @	13.12 hrs,	Volume=	0.089 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Peak Elev= 949.82' @ 13.12 hrs Surf.Area= 1,921 sf Storage= 2,099 cf

Plug-Flow detention time= 267.5 min calculated for 0.089 af (100% of inflow)
Center-of-Mass det. time= 267.5 min (1,026.9 - 759.4)

Volume	Invert	Avail.Storage	Storage Description
#1	948.50'	3,519 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

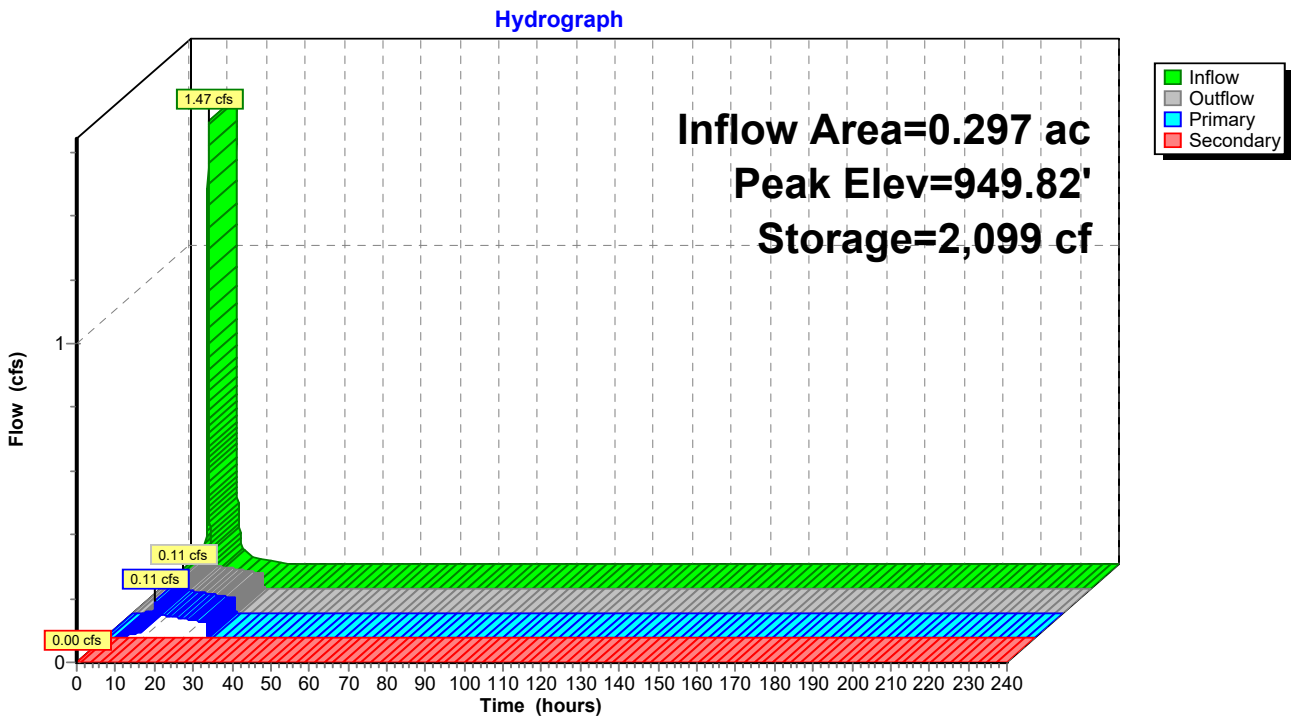
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.50	1,261	0	0
949.00	1,497	690	690
950.00	2,011	1,754	2,444
950.50	2,290	1,075	3,519

Device	Routing	Invert	Outlet Devices
#1	Primary	946.50'	**12.0" Round Culvert** L= 20.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 946.50' / 946.00' S= 0.0250 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	949.80'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	948.50'	**1.600 in/hr Exfiltration over Surface area**
#4	Secondary	950.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.11 cfs @ 13.12 hrs HW=949.82' (Free Discharge)
└─**1=Culvert** (Passes 0.11 cfs of 5.61 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 0.04 cfs @ 0.52 fps)
  └─**3=Exfiltration** (Exfiltration Controls 0.07 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=948.50' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: ABOVEGROUND FILTRATION BASIN 2



Stage-Discharge for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
948.50	0.00	0.00	0.00
948.52	0.05	0.05	0.00
948.54	0.05	0.05	0.00
948.56	0.05	0.05	0.00
948.58	0.05	0.05	0.00
948.60	0.05	0.05	0.00
948.62	0.05	0.05	0.00
948.64	0.05	0.05	0.00
948.66	0.05	0.05	0.00
948.68	0.05	0.05	0.00
948.70	0.05	0.05	0.00
948.72	0.05	0.05	0.00
948.74	0.05	0.05	0.00
948.76	0.05	0.05	0.00
948.78	0.05	0.05	0.00
948.80	0.05	0.05	0.00
948.82	0.05	0.05	0.00
948.84	0.05	0.05	0.00
948.86	0.05	0.05	0.00
948.88	0.05	0.05	0.00
948.90	0.05	0.05	0.00
948.92	0.05	0.05	0.00
948.94	0.05	0.05	0.00
948.96	0.05	0.05	0.00
948.98	0.06	0.06	0.00
949.00	0.06	0.06	0.00
949.02	0.06	0.06	0.00
949.04	0.06	0.06	0.00
949.06	0.06	0.06	0.00
949.08	0.06	0.06	0.00
949.10	0.06	0.06	0.00
949.12	0.06	0.06	0.00
949.14	0.06	0.06	0.00
949.16	0.06	0.06	0.00
949.18	0.06	0.06	0.00
949.20	0.06	0.06	0.00
949.22	0.06	0.06	0.00
949.24	0.06	0.06	0.00
949.26	0.06	0.06	0.00
949.28	0.06	0.06	0.00
949.30	0.06	0.06	0.00
949.32	0.06	0.06	0.00
949.34	0.06	0.06	0.00
949.36	0.06	0.06	0.00
949.38	0.06	0.06	0.00
949.40	0.06	0.06	0.00
949.42	0.06	0.06	0.00
949.44	0.06	0.06	0.00
949.46	0.06	0.06	0.00
949.48	0.06	0.06	0.00
949.50	0.06	0.06	0.00
949.52	0.07	0.07	0.00
949.54	0.07	0.07	0.00
949.56	0.07	0.07	0.00
949.58	0.07	0.07	0.00
949.60	0.07	0.07	0.00
949.62	0.07	0.07	0.00
949.64	0.07	0.07	0.00
949.66	0.07	0.07	0.00
949.68	0.07	0.07	0.00
949.70	0.07	0.07	0.00
949.72	0.07	0.07	0.00
949.74	0.07	0.07	0.00
949.76	0.07	0.07	0.00
949.78	0.07	0.07	0.00
949.80	0.07	0.07	0.00
949.82	0.10	0.10	0.00
949.84	0.15	0.15	0.00
949.86	0.22	0.22	0.00
949.88	0.30	0.30	0.00
949.90	0.40	0.40	0.00
949.92	0.50	0.50	0.00
949.94	0.61	0.61	0.00
949.96	0.73	0.73	0.00
949.98	0.86	0.86	0.00
950.00	0.99	0.99	0.00
950.02	1.19	1.13	0.05
950.04	1.44	1.28	0.15
950.06	1.72	1.44	0.28
950.08	2.03	1.60	0.43
950.10	2.37	1.76	0.60
950.12	2.73	1.94	0.79
950.14	3.11	2.11	1.00
950.16	3.52	2.30	1.22
950.18	3.86	2.41	1.45
950.20	4.17	2.47	1.70
950.22	4.51	2.53	1.98
950.24	4.86	2.59	2.27
950.26	5.22	2.64	2.58
950.28	5.60	2.70	2.90
950.30	5.99	2.75	3.23
950.32	6.39	2.81	3.59
950.34	6.81	2.86	3.95
950.36	7.25	2.91	4.33
950.38	7.69	2.96	4.73
950.40	8.15	3.01	5.14
950.42	8.62	3.06	5.56
950.44	9.11	3.11	6.00
950.46	9.61	3.16	6.45
950.48	10.12	3.20	6.92
950.50	**10.65**	**3.25**	**7.40**

Stage-Area-Storage for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
948.50	1,261	0
948.52	1,270	25
948.54	1,280	51
948.56	1,289	77
948.58	1,299	102
948.60	1,308	128
948.62	1,318	155
948.64	1,327	181
948.66	1,337	208
948.68	1,346	235
948.70	1,355	262
948.72	1,365	289
948.74	1,374	316
948.76	1,384	344
948.78	1,393	372
948.80	1,403	400
948.82	1,412	428
948.84	1,421	456
948.86	1,431	485
948.88	1,440	513
948.90	1,450	542
948.92	1,459	571
948.94	1,469	601
948.96	1,478	630
948.98	1,488	660
949.00	1,497	690
949.02	1,507	720
949.04	1,518	750
949.06	1,528	780
949.08	1,538	811
949.10	1,548	842
949.12	1,559	873
949.14	1,569	904
949.16	1,579	936
949.18	1,590	967
949.20	1,600	999
949.22	1,610	1,031
949.24	1,620	1,064
949.26	1,631	1,096
949.28	1,641	1,129
949.30	1,651	1,162
949.32	1,661	1,195
949.34	1,672	1,228
949.36	1,682	1,262
949.38	1,692	1,295
949.40	1,703	1,329
949.42	1,713	1,364
949.44	1,723	1,398
949.46	1,733	1,433
949.48	1,744	1,467
949.50	1,754	1,502
949.52	1,764	1,537
949.54	1,775	1,573
949.56	1,785	1,608
949.58	1,795	1,644
949.60	1,805	1,680
949.62	1,816	1,716
949.64	1,826	1,753
949.66	1,836	1,789
949.68	1,847	1,826
949.70	1,857	1,863
949.72	1,867	1,901
949.74	1,877	1,938
949.76	1,888	1,976
949.78	1,898	2,014
949.80	1,908	2,052
949.82	1,918	2,090
949.84	1,929	2,128
949.86	1,939	2,167
949.88	1,949	2,206
949.90	1,960	2,245
949.92	1,970	2,284
949.94	1,980	2,324
949.96	1,990	2,363
949.98	2,001	2,403
950.00	2,011	2,444
950.02	2,022	2,484
950.04	2,033	2,524
950.06	2,044	2,565
950.08	2,056	2,606
950.10	2,067	2,647
950.12	2,078	2,689
950.14	2,089	2,731
950.16	2,100	2,772
950.18	2,111	2,815
950.20	2,123	2,857
950.22	2,134	2,899
950.24	2,145	2,942
950.26	2,156	2,985
950.28	2,167	3,028
950.30	2,178	3,072
950.32	2,190	3,116
950.34	2,201	3,159
950.36	2,212	3,204
950.38	2,223	3,248
950.40	2,234	3,293
950.42	2,245	3,337
950.44	2,257	3,382
950.46	2,268	3,428
950.48	2,279	3,473
950.50	**2,290**	**3,519**

Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment PR1A: PR1A - DRAINS TO Runoff Area=151,857 sf 79.78% Impervious Runoff Depth=6.59"
Tc=10.0 min CN=WQ Runoff=31.05 cfs 1.914 af

Subcatchment PR1B: PR1B - DRAINS TO Runoff Area=12,953 sf 77.23% Impervious Runoff Depth=6.54"
Tc=10.0 min CN=WQ Runoff=2.64 cfs 0.162 af

Subcatchment PR1C: PR1C - DRAINS TO Runoff Area=188,479 sf 9.19% Impervious Runoff Depth=5.12"
Tc=10.0 min CN=WQ Runoff=33.18 cfs 1.845 af

Subcatchment PR2: PR2 - DRAINS NORTH Runoff Area=13,188 sf 0.00% Impervious Runoff Depth=4.93"
Tc=10.0 min CN=WQ Runoff=2.27 cfs 0.124 af

Pond 1P: UNDERGROUND RATE Peak Elev=953.95' Storage=35,547 cf Inflow=31.05 cfs 1.914 af
Outflow=14.56 cfs 1.914 af

Pond 2P: ABOVEGROUND FILTRATION Peak Elev=950.07' Storage=2,584 cf Inflow=2.64 cfs 0.162 af
Primary=1.51 cfs 0.159 af Secondary=0.35 cfs 0.003 af Outflow=1.86 cfs 0.162 af

Total Runoff Area = 8.413 ac Runoff Volume = 4.046 af Average Runoff Depth = 5.77"
59.49% Pervious = 5.005 ac 40.51% Impervious = 3.409 ac

ry for Subcatchment PR1A: PR1A - DRAINS TO UNDERGROUND FILTRATION BASIN 1 THEN SOUTH T

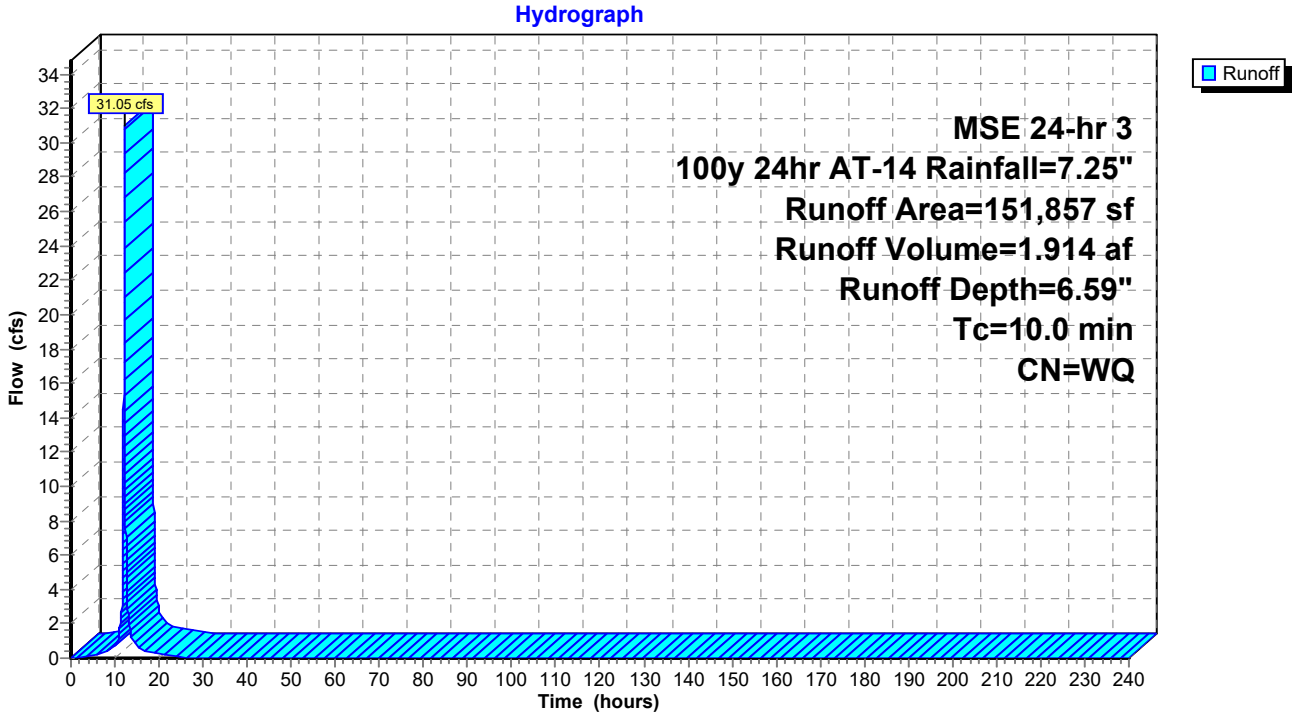
Runoff = 31.05 cfs @ 12.17 hrs, Volume= 1.914 af, Depth= 6.59"
Routed to Pond 1P : UNDERGROUND RATE CONTROL BASIN 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.25"

Area (sf)	CN	Description
121,156	98	Paved parking, HSG D
30,701	80	>75% Grass cover, Good, HSG D
151,857		Weighted Average
30,701		20.22% Pervious Area
121,156		79.78% Impervious Area

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

ubcatchment PR1A: PR1A - DRAINS TO UNDERGROUND FILTRATION BASIN 1 THEN SOUTH TO WETL



ry for Subcatchment PR1B: PR1B - DRAINS TO ABOVEGROUND FILTRATION BASIN 2 THEN SOUTH T

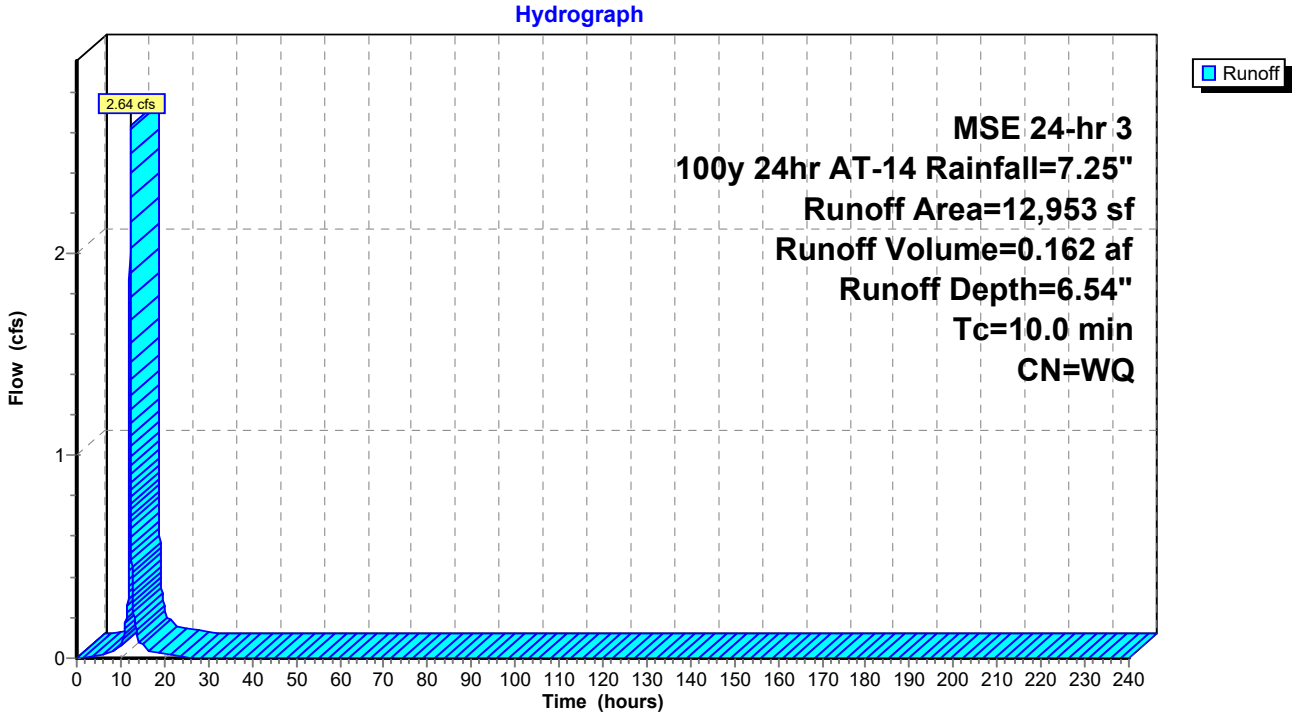
Runoff = 2.64 cfs @ 12.17 hrs, Volume= 0.162 af, Depth= 6.54"
Routed to Pond 2P : ABOVEGROUND FILTRATION BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.25"

Area (sf)	CN	Description
10,004	98	Paved parking, HSG D
2,949	80	>75% Grass cover, Good, HSG D
12,953		Weighted Average
2,949		22.77% Pervious Area
10,004		77.23% Impervious Area

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

ubcatchment PR1B: PR1B - DRAINS TO ABOVEGROUND FILTRATION BASIN 2 THEN SOUTH TO WETL



Summary for Subcatchment PR1C: PR1C - DRAINS TO WETLAND - UNTREATED

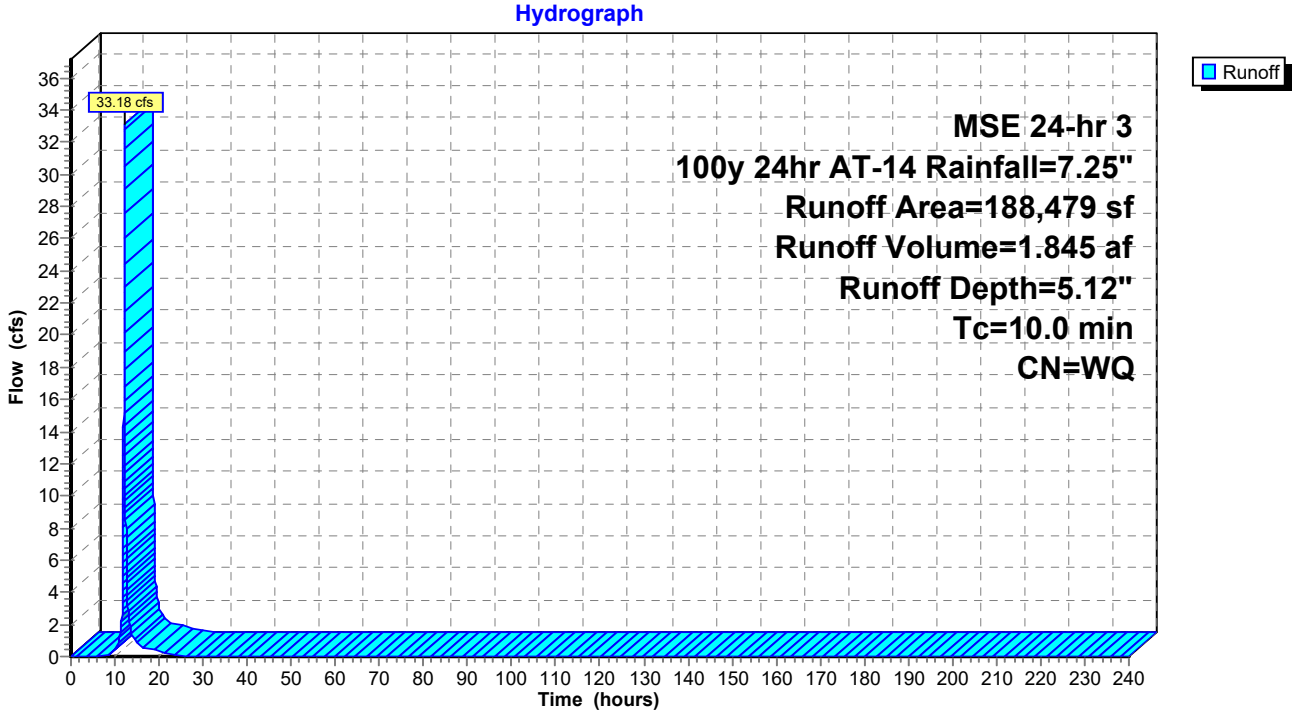
Runoff = 33.18 cfs @ 12.17 hrs, Volume= 1.845 af, Depth= 5.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.25"

Area (sf)	CN	Description
17,318	98	Paved parking, HSG D
171,161	80	>75% Grass cover, Good, HSG D
188,479		Weighted Average
171,161		90.81% Pervious Area
17,318		9.19% Impervious Area

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

Subcatchment PR1C: PR1C - DRAINS TO WETLAND - UNTREATED



Summary for Subcatchment PR2: PR2 - DRAINS NORTH TO HIGHWAY 5 - UNTREATED

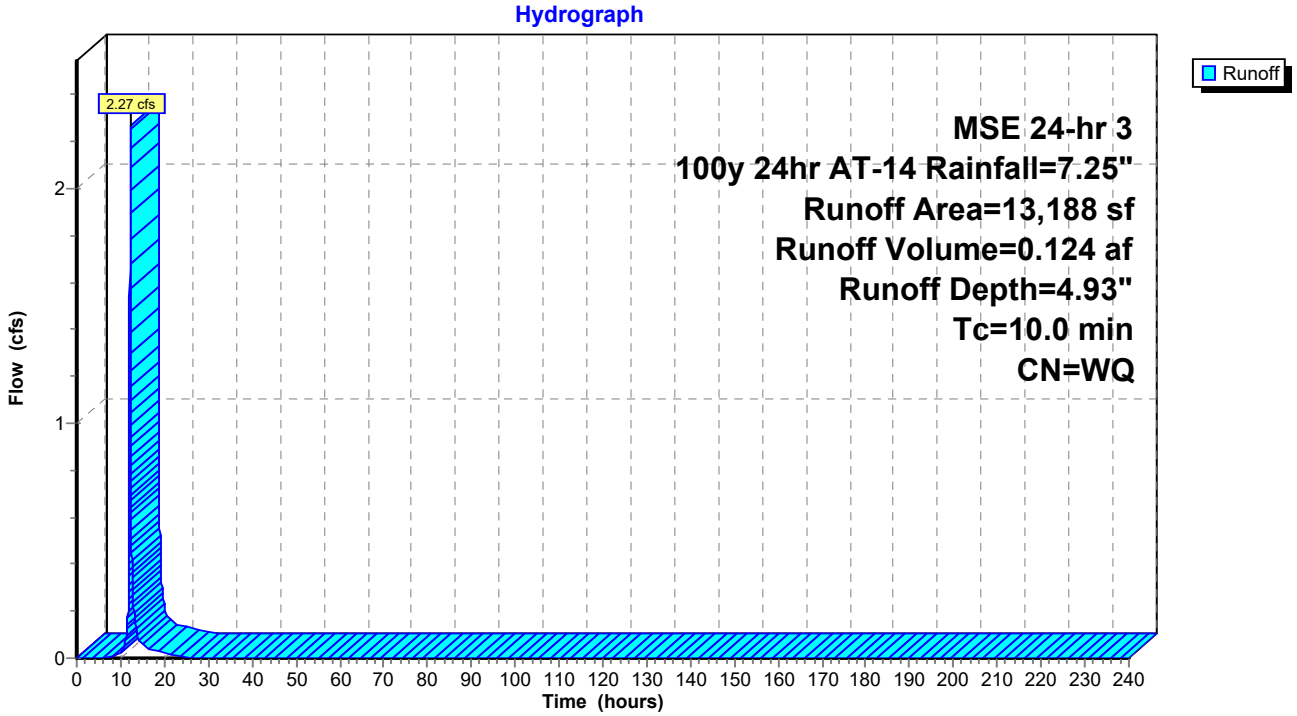
Runoff = 2.27 cfs @ 12.17 hrs, Volume= 0.124 af, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.25"

Area (sf)	CN	Description
0	98	Paved parking, HSG D
13,188	80	>75% Grass cover, Good, HSG D
13,188		Weighted Average
13,188		100.00% Pervious Area

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

Subcatchment PR2: PR2 - DRAINS NORTH TO HIGHWAY 5 - UNTREATED



Summary for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Inflow Area = 3.486 ac, 79.78% Impervious, Inflow Depth = 6.59" for 100y 24hr AT-14 event
Inflow = 31.05 cfs @ 12.17 hrs, Volume= 1.914 af
Outflow = 14.56 cfs @ 12.32 hrs, Volume= 1.914 af, Atten= 53%, Lag= 8.9 min
Primary = 14.56 cfs @ 12.32 hrs, Volume= 1.914 af

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Peak Elev= 953.95' @ 12.32 hrs Surf.Area= 10,324 sf Storage= 35,547 cf

Plug-Flow detention time= 312.0 min calculated for 1.914 af (100% of inflow)
Center-of-Mass det. time= 312.0 min (1,063.7 - 751.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	949.25'	11,678 cf	**44.50'W x 232.00'L x 5.50'H Field A** 56,782 cf Overall - 27,587 cf Embedded = 29,195 cf x 40.0% Voids
#2A	949.25'	27,587 cf	**CMP Round 60** x 66 Inside #1 Effective Size= 60.0"W x 60.0"H => 19.63 sf x 20.00'L = 392.7 cf Overall Size= 60.0"W x 60.0"H x 20.00'L 66 Chambers in 6 Rows 42.50' Header x 19.63 sf x 2 = 1,669.0 cf Inside
		39,265 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	947.25'	**18.0" Round Culvert** L= 290.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 947.25' / 945.00' S= 0.0078 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#2	Device 1	952.10'	**2.1' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	949.25'	**0.340 cfs Constant Flow/Skimmer**

Primary OutFlow Max=14.56 cfs @ 12.32 hrs HW=953.95' (Free Discharge)
└─**1=Culvert** (Passes 14.56 cfs of 15.52 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 14.22 cfs @ 4.45 fps)
  └─**3=Constant Flow/Skimmer** (Constant Controls 0.34 cfs)

Pond 1P: UNDERGROUND RATE CONTROL BASIN 1 - Chamber Wizard Field A

Chamber Model = CMP Round 60 (Round Corrugated Metal Pipe)
Effective Size= 60.0"W x 60.0"H => 19.63 sf x 20.00'L = 392.7 cf
Overall Size= 60.0"W x 60.0"H x 20.00'L

60.0" Wide + 30.0" Spacing = 90.0" C-C Row Spacing

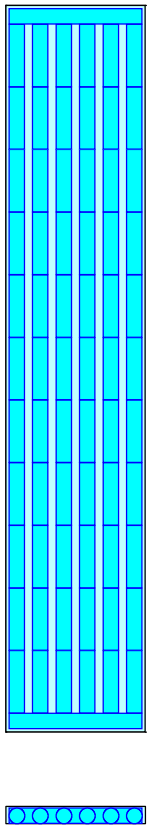
11 Chambers/Row x 20.00' Long +5.00' Header x 2 = 230.00' Row Length +12.0" End Stone x 2 = 232.00' Base Length
6 Rows x 60.0" Wide + 30.0" Spacing x 5 + 12.0" Side Stone x 2 = 44.50' Base Width
60.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

66 Chambers x 392.7 cf + 42.50' Header x 19.63 sf x 2 = 27,587.1 cf Chamber Storage

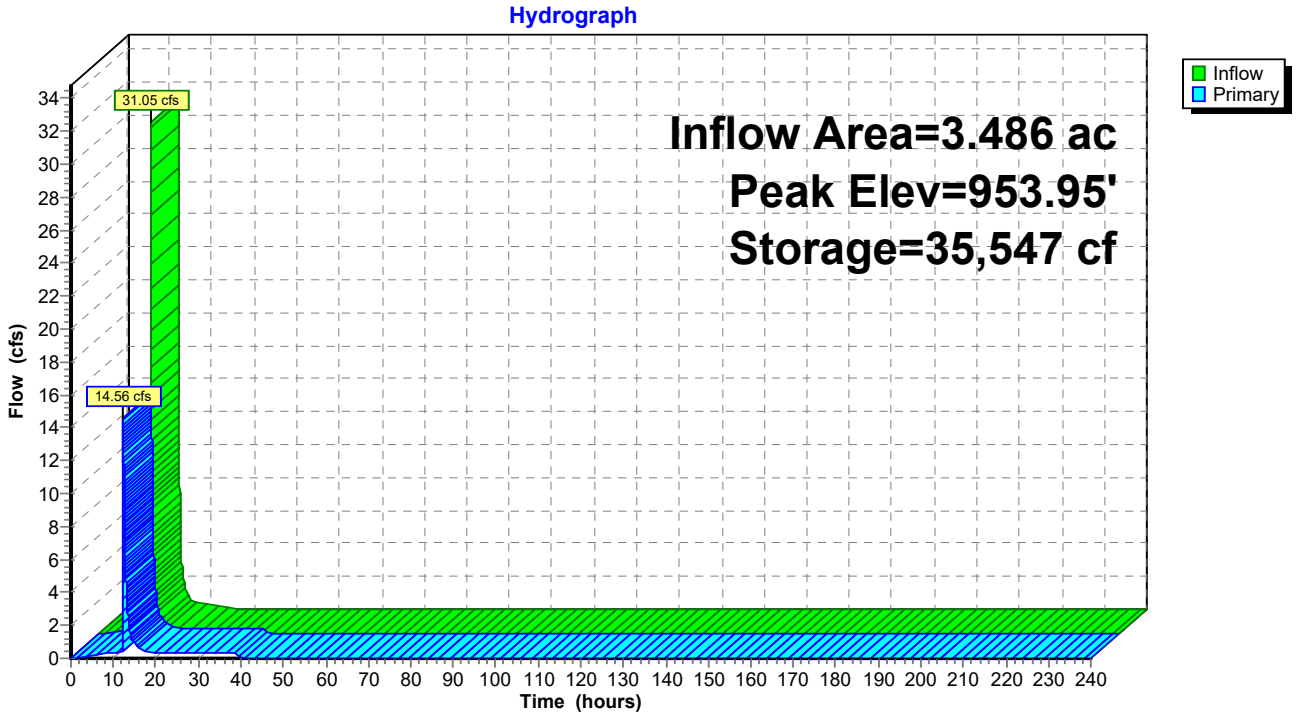
56,782.0 cf Field - 27,587.1 cf Chambers = 29,194.9 cf Stone x 40.0% Voids = 11,678.0 cf Stone Storage

Chamber Storage + Stone Storage = 39,265.1 cf = 0.901 af
Overall Storage Efficiency = 69.2%
Overall System Size = 232.00' x 44.50' x 5.50'

66 Chambers
2,103.0 cy Field
1,081.3 cy Stone



Pond 1P: UNDERGROUND RATE CONTROL BASIN 1



Stage-Discharge for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
949.25	0.00	951.85	0.34	954.45	16.03
949.30	0.34	951.90	0.34	954.50	16.08
949.35	0.34	951.95	0.34	954.55	16.13
949.40	0.34	952.00	0.34	954.60	16.18
949.45	0.34	952.05	0.34	954.65	16.23
949.50	0.34	952.10	0.34	954.70	16.28
949.55	0.34	952.15	0.42	954.75	**16.33**
949.60	0.34	952.20	0.56		
949.65	0.34	952.25	0.73		
949.70	0.34	952.30	0.94		
949.75	0.34	952.35	1.18		
949.80	0.34	952.40	1.44		
949.85	0.34	952.45	1.71		
949.90	0.34	952.50	2.01		
949.95	0.34	952.55	2.32		
950.00	0.34	952.60	2.65		
950.05	0.34	952.65	2.99		
950.10	0.34	952.70	3.35		
950.15	0.34	952.75	3.72		
950.20	0.34	952.80	4.09		
950.25	0.34	952.85	4.48		
950.30	0.34	952.90	4.88		
950.35	0.34	952.95	5.29		
950.40	0.34	953.00	5.70		
950.45	0.34	953.05	6.12		
950.50	0.34	953.10	6.55		
950.55	0.34	953.15	6.99		
950.60	0.34	953.20	7.43		
950.65	0.34	953.25	7.88		
950.70	0.34	953.30	8.34		
950.75	0.34	953.35	8.79		
950.80	0.34	953.40	9.26		
950.85	0.34	953.45	9.73		
950.90	0.34	953.50	10.20		
950.95	0.34	953.55	10.67		
951.00	0.34	953.60	11.15		
951.05	0.34	953.65	11.64		
951.10	0.34	953.70	12.12		
951.15	0.34	953.75	12.61		
951.20	0.34	953.80	13.10		
951.25	0.34	953.85	13.59		
951.30	0.34	953.90	14.08		
951.35	0.34	953.95	14.57		
951.40	0.34	954.00	15.07		
951.45	0.34	954.05	15.57		
951.50	0.34	954.10	15.68		
951.55	0.34	954.15	15.73		
951.60	0.34	954.20	15.78		
951.65	0.34	954.25	15.83		
951.70	0.34	954.30	15.88		
951.75	0.34	954.35	15.93		
951.80	0.34	954.40	15.98		

Stage-Area-Storage for Pond 1P: UNDERGROUND RATE CONTROL BASIN 1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
949.25	0	951.85	19,434	954.45	38,026
949.30	227	951.90	19,851	954.50	38,233
949.35	492	951.95	20,268	954.55	38,439
949.40	764	952.00	20,685	954.60	38,646
949.45	1,048	952.05	21,100	954.65	38,852
949.50	1,342	952.10	21,516	954.70	39,059
949.55	1,644	952.15	21,931	954.75	**39,265**
949.60	1,955	952.20	22,345		
949.65	2,272	952.25	22,758		
949.70	2,596	952.30	23,171		
949.75	2,926	952.35	23,582		
949.80	3,262	952.40	23,993		
949.85	3,603	952.45	24,402		
949.90	3,949	952.50	24,811		
949.95	4,299	952.55	25,217		
950.00	4,654	952.60	25,623		
950.05	5,013	952.65	26,027		
950.10	5,376	952.70	26,429		
950.15	5,743	952.75	26,829		
950.20	6,113	952.80	27,228		
950.25	6,486	952.85	27,625		
950.30	6,863	952.90	28,020		
950.35	7,243	952.95	28,412		
950.40	7,625	953.00	28,802		
950.45	8,010	953.05	29,190		
950.50	8,398	953.10	29,575		
950.55	8,788	953.15	29,958		
950.60	9,181	953.20	30,337		
950.65	9,575	953.25	30,714		
950.70	9,972	953.30	31,087		
950.75	10,371	953.35	31,458		
950.80	10,771	953.40	31,824		
950.85	11,174	953.45	32,187		
950.90	11,577	953.50	32,546		
950.95	11,983	953.55	32,901		
951.00	12,390	953.60	33,252		
951.05	12,798	953.65	33,597		
951.10	13,207	953.70	33,938		
951.15	13,618	953.75	34,274		
951.20	14,029	953.80	34,604		
951.25	14,442	953.85	34,928		
951.30	14,855	953.90	35,246		
951.35	15,270	953.95	35,556		
951.40	15,684	954.00	35,858		
951.45	16,100	954.05	36,152		
951.50	16,516	954.10	36,436		
951.55	16,932	954.15	36,708		
951.60	17,349	954.20	36,966		
951.65	17,766	954.25	37,200		
951.70	18,183	954.30	37,407		
951.75	18,600	954.35	37,613		
951.80	19,017	954.40	37,820		

Summary for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Inflow Area = 0.297 ac, 77.23% Impervious, Inflow Depth = 6.54" for 100y 24hr AT-14 event
Inflow = 2.64 cfs @ 12.17 hrs, Volume= 0.162 af
Outflow = 1.86 cfs @ 12.25 hrs, Volume= 0.162 af, Atten= 29%, Lag= 5.0 min
Primary = 1.51 cfs @ 12.25 hrs, Volume= 0.159 af
Secondary = 0.35 cfs @ 12.25 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Peak Elev= 950.07' @ 12.25 hrs Surf.Area= 2,050 sf Storage= 2,584 cf

Plug-Flow detention time= 188.5 min calculated for 0.162 af (100% of inflow)
Center-of-Mass det. time= 188.5 min (941.2 - 752.6)

Volume	Invert	Avail.Storage	Storage Description
#1	948.50'	3,519 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

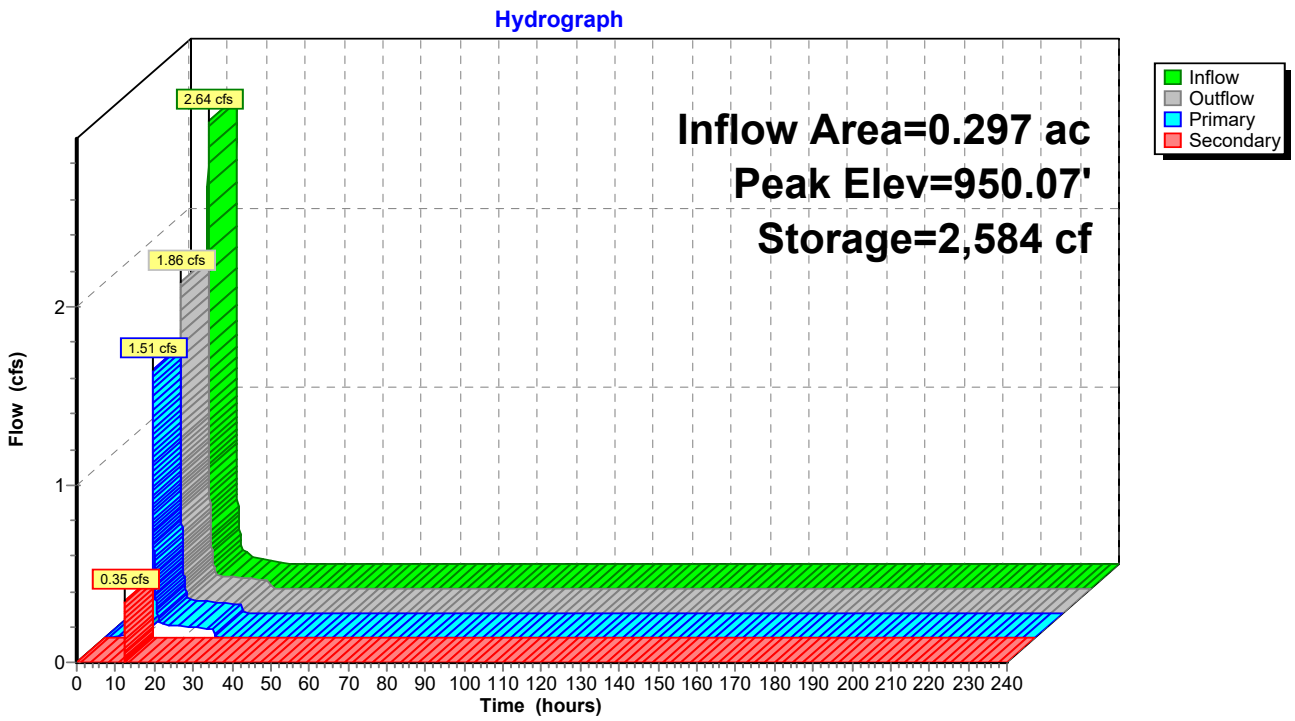
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.50	1,261	0	0
949.00	1,497	690	690
950.00	2,011	1,754	2,444
950.50	2,290	1,075	3,519

Device	Routing	Invert	Outlet Devices
#1	Primary	946.50'	**12.0" Round Culvert** L= 20.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 946.50' / 946.00' S= 0.0250 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	949.80'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	948.50'	**1.600 in/hr Exfiltration over Surface area**
#4	Secondary	950.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=1.51 cfs @ 12.25 hrs HW=950.07' (Free Discharge)
└─**1=Culvert** (Passes 1.51 cfs of 5.85 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 1.43 cfs @ 1.70 fps)
  └─**3=Exfiltration** (Exfiltration Controls 0.08 cfs)

Secondary OutFlow Max=0.35 cfs @ 12.25 hrs HW=950.07' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 0.35 cfs @ 0.63 fps)

Pond 2P: ABOVEGROUND FILTRATION BASIN 2



Stage-Discharge for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
948.50	0.00	0.00	0.00
948.52	0.05	0.05	0.00
948.54	0.05	0.05	0.00
948.56	0.05	0.05	0.00
948.58	0.05	0.05	0.00
948.60	0.05	0.05	0.00
948.62	0.05	0.05	0.00
948.64	0.05	0.05	0.00
948.66	0.05	0.05	0.00
948.68	0.05	0.05	0.00
948.70	0.05	0.05	0.00
948.72	0.05	0.05	0.00
948.74	0.05	0.05	0.00
948.76	0.05	0.05	0.00
948.78	0.05	0.05	0.00
948.80	0.05	0.05	0.00
948.82	0.05	0.05	0.00
948.84	0.05	0.05	0.00
948.86	0.05	0.05	0.00
948.88	0.05	0.05	0.00
948.90	0.05	0.05	0.00
948.92	0.05	0.05	0.00
948.94	0.05	0.05	0.00
948.96	0.05	0.05	0.00
948.98	0.06	0.06	0.00
949.00	0.06	0.06	0.00
949.02	0.06	0.06	0.00
949.04	0.06	0.06	0.00
949.06	0.06	0.06	0.00
949.08	0.06	0.06	0.00
949.10	0.06	0.06	0.00
949.12	0.06	0.06	0.00
949.14	0.06	0.06	0.00
949.16	0.06	0.06	0.00
949.18	0.06	0.06	0.00
949.20	0.06	0.06	0.00
949.22	0.06	0.06	0.00
949.24	0.06	0.06	0.00
949.26	0.06	0.06	0.00
949.28	0.06	0.06	0.00
949.30	0.06	0.06	0.00
949.32	0.06	0.06	0.00
949.34	0.06	0.06	0.00
949.36	0.06	0.06	0.00
949.38	0.06	0.06	0.00
949.40	0.06	0.06	0.00
949.42	0.06	0.06	0.00
949.44	0.06	0.06	0.00
949.46	0.06	0.06	0.00
949.48	0.06	0.06	0.00
949.50	0.06	0.06	0.00
949.52	0.07	0.07	0.00
949.54	0.07	0.07	0.00
949.56	0.07	0.07	0.00
949.58	0.07	0.07	0.00
949.60	0.07	0.07	0.00
949.62	0.07	0.07	0.00
949.64	0.07	0.07	0.00
949.66	0.07	0.07	0.00
949.68	0.07	0.07	0.00
949.70	0.07	0.07	0.00
949.72	0.07	0.07	0.00
949.74	0.07	0.07	0.00
949.76	0.07	0.07	0.00
949.78	0.07	0.07	0.00
949.80	0.07	0.07	0.00
949.82	0.10	0.10	0.00
949.84	0.15	0.15	0.00
949.86	0.22	0.22	0.00
949.88	0.30	0.30	0.00
949.90	0.40	0.40	0.00
949.92	0.50	0.50	0.00
949.94	0.61	0.61	0.00
949.96	0.73	0.73	0.00
949.98	0.86	0.86	0.00
950.00	0.99	0.99	0.00
950.02	1.19	1.13	0.05
950.04	1.44	1.28	0.15
950.06	1.72	1.44	0.28
950.08	2.03	1.60	0.43
950.10	2.37	1.76	0.60
950.12	2.73	1.94	0.79
950.14	3.11	2.11	1.00
950.16	3.52	2.30	1.22
950.18	3.86	2.41	1.45
950.20	4.17	2.47	1.70
950.22	4.51	2.53	1.98
950.24	4.86	2.59	2.27
950.26	5.22	2.64	2.58
950.28	5.60	2.70	2.90
950.30	5.99	2.75	3.23
950.32	6.39	2.81	3.59
950.34	6.81	2.86	3.95
950.36	7.25	2.91	4.33
950.38	7.69	2.96	4.73
950.40	8.15	3.01	5.14
950.42	8.62	3.06	5.56
950.44	9.11	3.11	6.00
950.46	9.61	3.16	6.45
950.48	10.12	3.20	6.92
950.50	**10.65**	**3.25**	**7.40**

Stage-Area-Storage for Pond 2P: ABOVEGROUND FILTRATION BASIN 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
948.50	1,261	0
948.52	1,270	25
948.54	1,280	51
948.56	1,289	77
948.58	1,299	102
948.60	1,308	128
948.62	1,318	155
948.64	1,327	181
948.66	1,337	208
948.68	1,346	235
948.70	1,355	262
948.72	1,365	289
948.74	1,374	316
948.76	1,384	344
948.78	1,393	372
948.80	1,403	400
948.82	1,412	428
948.84	1,421	456
948.86	1,431	485
948.88	1,440	513
948.90	1,450	542
948.92	1,459	571
948.94	1,469	601
948.96	1,478	630
948.98	1,488	660
949.00	1,497	690
949.02	1,507	720
949.04	1,518	750
949.06	1,528	780
949.08	1,538	811
949.10	1,548	842
949.12	1,559	873
949.14	1,569	904
949.16	1,579	936
949.18	1,590	967
949.20	1,600	999
949.22	1,610	1,031
949.24	1,620	1,064
949.26	1,631	1,096
949.28	1,641	1,129
949.30	1,651	1,162
949.32	1,661	1,195
949.34	1,672	1,228
949.36	1,682	1,262
949.38	1,692	1,295
949.40	1,703	1,329
949.42	1,713	1,364
949.44	1,723	1,398
949.46	1,733	1,433
949.48	1,744	1,467
949.50	1,754	1,502
949.52	1,764	1,537
949.54	1,775	1,573
949.56	1,785	1,608
949.58	1,795	1,644
949.60	1,805	1,680
949.62	1,816	1,716
949.64	1,826	1,753
949.66	1,836	1,789
949.68	1,847	1,826
949.70	1,857	1,863
949.72	1,867	1,901
949.74	1,877	1,938
949.76	1,888	1,976
949.78	1,898	2,014
949.80	1,908	2,052
949.82	1,918	2,090
949.84	1,929	2,128
949.86	1,939	2,167
949.88	1,949	2,206
949.90	1,960	2,245
949.92	1,970	2,284
949.94	1,980	2,324
949.96	1,990	2,363
949.98	2,001	2,403
950.00	2,011	2,444
950.02	2,022	2,484
950.04	2,033	2,524
950.06	2,044	2,565
950.08	2,056	2,606
950.10	2,067	2,647
950.12	2,078	2,689
950.14	2,089	2,731
950.16	2,100	2,772
950.18	2,111	2,815
950.20	2,123	2,857
950.22	2,134	2,899
950.24	2,145	2,942
950.26	2,156	2,985
950.28	2,167	3,028
950.30	2,178	3,072
950.32	2,190	3,116
950.34	2,201	3,159
950.36	2,212	3,204
950.38	2,223	3,248
950.40	2,234	3,293
950.42	2,245	3,337
950.44	2,257	3,382
950.46	2,268	3,428
950.48	2,279	3,473
950.50	**2,290**	**3,519**

SAND FILTER

Project Information

Calculator Version:	Version 4: July 2020
Project Name:	AMIR VICTORIA
User Name / Company Name:	MS-CSG
Date:	6/28/23
Project Description:	
Construction Permit?:	No

Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55386
Annual Rainfall (inches):	29.5
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				0.705	0.705
				Impervious Area (acres)	2.781
				Total Area (acres)	3.486

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				0.705	0.705
				Impervious Area (acres)	2.781
				Total Area (acres)	3.486

SAND FILTER

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	11104	ft3
Volume removed by BMPs towards performance goal:		ft^3
Percent volume removed towards performance goal		**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	6.2353	acre-ft
Annual runoff volume removed by BMPs:	0	acre-ft
Percent annual runoff volume removed:	**0**	**%**
Post development annual particulate P load:	2.7984	lbs
Annual particulate P removed by BMPs:	1.315	lbs
Post development annual dissolved P load:	2.29	lbs
Annual dissolved P removed by BMPs:	0	lbs
Total P removed by BMPs	1.315	lbs
Percent annual total phosphorus removed:	**26**	**%**
Post development annual TSS load:	924.3	lbs
Annual TSS removed by BMPs:	785.7	lbs
Percent annual TSS removed:	**85**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
1 - Sand filter	0	11104	0	11104	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
1 - Sand filter	6.2353	0	0	6.2353	0

Particulate Phosphorus Summary

SAND FILTER

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Sand filter	2.7984	0	1.3152	1.4832	47

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Sand filter	2.2896	0	0	2.2896	0

Total Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Sand filter	5.088	0	1.3152	3.7728	24

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Sand filter	924.32	0	785.67	138.65	85

BMP Schematic

1 - Sand filter

PhosPhoSorb

Project Information

Calculator Version:	Version 4: July 2020
Project Name:	AMIR VICTORIA
User Name / Company Name:	MS-CSG
Date:	6/28/23
Project Description:	
Construction Permit?:	No

Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55386
Annual Rainfall (inches):	29.5
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				0.705	0.705
				Impervious Area (acres)	2.781
				Total Area (acres)	3.486

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				0.705	0.705
				Impervious Area (acres)	2.781
				Total Area (acres)	3.486

Phosphosorb

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	11104	ft3
Volume removed by BMPs towards performance goal:		ft^3
Percent volume removed towards performance goal		**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	6.2353	acre-ft
Annual runoff volume removed by BMPs:	0	acre-ft
Percent annual runoff volume removed:	**0**	**%**
Post development annual particulate P load:	2.7984	lbs
Annual particulate P removed by BMPs:	1.399	lbs
Post development annual dissolved P load:	2.29	lbs
Annual dissolved P removed by BMPs:	1.145	lbs
Total P removed by BMPs	2.544	lbs
Percent annual total phosphorus removed:	**50**	**%**
Post development annual TSS load:	924.3	lbs
Annual TSS removed by BMPs:	0	lbs
Percent annual TSS removed:	**0**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
Phosphosorb Media (Stormfilter)	0	11104	0	11104	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
Phosphosorb Media (Stormfilter)	6.2353	0	0	6.2353	0

Particulate Phosphorus Summary

Phosphosorb

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Phosphosorb Media (Stormfilter)	2.7984	0	1.3992	1.3992	50

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Phosphosorb Media (Stormfilter)	2.2896	0	1.1448	1.1448	50

Total Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Phosphosorb Media (Stormfilter)	5.088	0	2.544	2.544	50

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Phosphosorb Media (Stormfilter)	924.32	0	0	924.32	0

BMP Schematic

Other

Phosphosorb Media
(Stormfilter)

Page Content

- 1 Definition and acronyms
- 2 What manufactured treatment devices are credited?
- 3 TP and TSS credits
- 4 Derivation of TP and TSS credits for specific mtds
  - 4.1 Filterra System
  - 4.2 StormFilter using PhosphoSorb Media
  - 4.3 Up-Flo Filter w/Filter Ribbons
  - 4.4 MWS-Linear Modular Wetland
  - 4.5 BayFilter w/EMC Media
  - 4.6 StormGarden Modular Stormwater Bio-filtration System
  - 4.7 BioPod Biofilter
  - 4.8 FloGard Perk Filter
  - 4.9 The Kraken
  - 4.10 Jellyfish Filter
  - 4.11 Contech Stormfilter using ZPG Media
  - 4.12 StormTree Biofiltration filter
- 5 Calculating annual volume treated
- 6 Analysis of TAPE data to determine applicability for deriving Minnesota credits
  - 6.1 Is the particle size distribution for stormwater runoff similar between the TAPE monitored sites and Minnesota?
  - 6.2 How does total phosphorus removal correlate with concentrations of TSS and the distribution of particulate and dissolved phosphorus in runoff?
  - 6.3 Is TP removal affected by influent phosphorus and TSS concentrations?
- 7 Rationale for and applicability of total phosphorus (TP) credits
  - 7.1 Rationale for Tier 1 TP credits
  - 7.2 Rationale for Tier 2 TP credits
- 8 Applicability of Tier 2 TP credits
- 9 Protocol for monitoring
- 10 Technical team (Acknowledgements)
- 11 References

TP and TSS credits and guidance for manufactured treatment devices (mtds)

This page provides total phosphorus (TP) and total suspended solid (TSS) removal **credits (stormwater credit)** (https://stormwater.pca.state.mn.us/index.php?title=Overview_of_stormwater_credits) for **manufactured treatment devices** (mtds) in the State of Minnesota. The page includes supporting information, guidance and recommendations, and links to additional information.

Information: Credits refer to the amount of pollutant reduced by treatment with a stormwater best management practice (BMP). Credits may applied in a variety of contexts, such as pollutant reduced as a percent of water treated or mass reduced for a specific event or time period (e.g., annual load reduced). Be aware of the context for credits discussed on this page. For more information on credits, see Overview of stormwater credits

Contents

- 1 Definition and acronyms
- 2 What manufactured treatment devices are credited?
- 3 TP and TSS credits
- 4 Derivation of TP and TSS credits for specific mtds
  - 4.1 Filterra System
  - 4.2 StormFilter using PhosphoSorb Media
  - 4.3 Up-Flo Filter w/Filter Ribbons
  - 4.4 MWS-Linear Modular Wetland
  - 4.5 BayFilter w/EMC Media
  - 4.6 StormGarden Modular Stormwater Bio-filtration System
  - 4.7 BioPod Biofilter
  - 4.8 FloGard Perk Filter

- 4.9 The Kraken
- 4.10 Jellyfish Filter
- 4.11 Contech Stormfilter using ZPG Media
- 4.12 StormTree Biofiltration filter
- 5 Calculating annual volume treated
- 6 Analysis of TAPE data to determine applicability for deriving Minnesota credits
  - 6.1 Is the particle size distribution for stormwater runoff similar between the TAPE monitored sites and Minnesota?
  - 6.2 How does total phosphorus removal correlate with concentrations of TSS and the distribution of particulate and dissolved phosphorus in runoff?
  - 6.3 Is TP removal affected by influent phosphorus and TSS concentrations?
- 7 Rationale for and applicability of total phosphorus (TP) credits
  - 7.1 Rationale for Tier 1 TP credits
  - 7.2 Rationale for Tier 2 TP credits
- 8 Applicability of Tier 2 TP credits
- 9 Protocol for monitoring
- 10 Technical team (Acknowledgements)
- 11 References

Definition and acronyms

A manufactured treatment device (mtd) is a pre-fabricated stormwater treatment structure utilizing **settling (sedimentation)** (https://stormwater.pca.state.mn.us/index.php?title=Stormwater_sedimentation_Best_Management_Practices), **filtration** (https://stormwater.pca.state.mn.us/index.php?title=Filtration), absorptive/adsorptive materials, vortex separation, vegetative components, and/or other appropriate technology to remove pollutants from stormwater runoff (New Jersey Department of Environmental Protection (http://www.njcat.org/)). MTDs are typically **proprietary devices**.

Acronyms

- CSW - construction stormwater
- DP – dissolved phosphorus
- GULD - General Use Level Designation
- LCL – Lower confidence limit of the mean (usually the 95% LCL)
- MTD (mtd) – manufactured treatment device
- MPCA - Minnesota Pollution Control Agency
- OP – orthophosphorus
- PP - particulate phosphorus
- TP – total phosphorus
- TAPE - Technology Assessment Program – Ecology
- TER – Technical Evaluation Report
- TPR - total phosphorus removed
- TSS – total suspended solids
- TSSR - total suspended solids removed

What manufactured treatment devices are credited?

Only Washington State Technology Assessment Protocol - Ecology (https://www.wastormwatercenter.org/stormwater-technologies/tape/) (TAPE) devices that received General Use Level Designation (https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies) (GULD) for Basic Treatment (TSS) and/or Phosphorus Treatment (TP) are credited for pollutant reductions. These devices typically are permanent structural practices providing **primary treatment** for pollutants. Devices designated for Pretreatment through the TAPE program are not included regardless of whether they have received GULD certification, since these are considered **pretreatment** (https://stormwater.pca.state.mn.us/index.php?title=Pretreatment) practices in Minnesota. Since pretreatment is required under the Construction Stormwater General Permit (https://stormwater.pca.state.mn.us/index.php?title=2018_Minnesota_Construction_Stormwater_Permit) (CSW permit), they are not credited for pollutant removal. The credits developed for practices requiring pretreatment such as **infiltration** (https://stormwater.pca.state.mn.us/index.php?title=Stormwater_infiltration_Best_Management_Practices) and **filtration** (https://stormwater.pca.state.mn.us/index.php?title=Filtration) systems already assume an adequate pretreatment system is included (see sections 16.6 and 17.5 of the Construction Stormwater general permit (https://stormwater.pca.state.mn.us/index.php?title=2018_Minnesota_Construction_Stormwater_Permit)). For more information on pretreatment devices, link here (https://stormwater.pca.state.mn.us/index.php?title=Pretreatment).

Pollutant removal credits are provided for the following devices. Tiered means there are multiple credit levels based on specific criteria, while non-tiered means there is a single value (i.e. just one credit value).

Phosphorus removal credits, as a percent of total phosphorus passing through the device. Note that to calculate the mass or percent of total phosphorus removed (e.g. annual phosphorus removed), you must multiply the number below by the amount of water being treated or by the total mass of water entering the device. The calculation of total phosphorus removed is therefore a function of device sizing.

Device	Tier 1	Tier 2	Tier 3
BayFilter w/EMC Media	50	59	
BioPod Biofilter	50	60	
BoxlessBioPod Biofilter	50	60	
ecoStorm plus	50		
Filterra Bioscape	50	60	
Filterra System	50	60	
FloGard Perk Filter	50	60	
Media Filtration System	50		
MWS-Linear Modular Wetland	50	54	
StormFilter using PhosphoSorb Media	50	60	70
StormGarden Modular Stormwater Bio-filtration System	50	53	
The Kraken	50	58	
Up-Flo Filter w/Filter Ribbons	50		
Jellyfish Filter	50	56	
StormTree Biofiltration practice	50	60	

Device name	Manufacturer	TAPE approval date	Total suspended solids	Total phosphorus
BayFilter w/EMC Media	BaySaver Technologies, Inc.	7/10/19	Non-tiered	Tiered
BioPod Biofilter	Oldcastle Infrastructure, Inc.	10/28/19	Non-tiered	Tiered
BoxlessBioPod Biofilter	Oldcastle Infrastructure, Inc.	2/12/21	Non-tiered	Tiered
ecoStorm plus	Watertectonics, Inc.	1/9/13	Non-tiered	Non-tiered
Filterra Bioscape	CONTECH Engineered Solutions, LLC.	9/16/19	Non-tiered	Tiered
Filterra System	CONTECH Engineered Solutions, LLC.	6/11/20	Non-tiered	Tiered
FloGard Perk Filter	Oldcastle Infrastructure, Inc.	8/9/18	Non-tiered	Tiered
Media Filtration System	CONTECH Engineered Solutions, LLC.	11/15/16	Non-tiered	Non-tiered
MWS-Linear Modular Wetland (https://stormwater.pca.state.mn.us/index.php?title=Contech_MWS-Linear_Modular_Wetland)	CONTECH Engineered Solutions, LLC.	12/16/19	Non-tiered	Tiered
StormFilter using PhosphoSorb Media	CONTECH Engineered Solutions, LLC.	1/2/20	Non-tiered	Tiered
StormFilter using ZPG Media	CONTECH Engineered Solutions, LLC.	4/14/17	Non-tiered	Non-tiered
StormGarden Modular Stormwater Bio-filtration System	Rotondo Environmental Solutions	8/28/19	Non-tiered	Tiered
The Kraken (https://stormwater.pca.state.mn.us/index.php?title=Contech_The_Kraken)	CONTECH Engineered Solutions, LLC.	12/16/19	Non-tiered	Tiered
Up-Flo Filter w/Filter Ribbons	Hydro International	3/5/19	Non-tiered	Non-tiered
Jellyfish Filter	CONTECH Engineered Solutions, LLC.	1/27/21	Non-tiered	Tiered
StormTree Biofiltration	StormTree	10/19/2021	Non-tiered	Tiered
Tiered means there are multiple credit levels based on specific criteria, while non-tiered means there is a single value (i.e. just one credit value)				

TP and TSS credits

Information: Credits may be modified based on additional analysis and information.

The procedure for developing credits is described in a document ***Protocol for assigning credits for phosphorus and total suspended solids (TSS) for manufactured treatment devices*** (https://stormwater.pca.state.mn.us/index.php?title=File:Protocol_for_assigning_credits_for_phosphorus_and_TSS_for_manufactured_treatment_devices_v_2.docx). This section provides an overview of this procedure.

To derive credits for GULD-approved mtds, data were compiled from Technical Evaluation Reports (TERs) for Washington State's Technology Assessment Program – Ecology (TAPE). We compiled and analyzed data for all storm events for each device. A summary of the analysis is provided in the adjacent table. The lower confidence limit (LCL) was derived using Washington State's bootstrap calculator (https://www.wastormwatercenter.org/wp-content/uploads/tape-bootstrap-ci-calculator-2011-08.xls). TP credits for each practice are provided in this table (https://stormwater.pca.state.mn.us/index.php?title=Credits_for_manufactured_treatment_devices).

Note the data summary table includes TAPE analysis and analysis of all data with TP **influent** concentrations exceeding 0.05 mg/L. TAPE analysis is based on samples with influent concentrations of 0.1 to 0.5 mg/L for TP. The analysis of data with concentrations greater than 0.051 represents the 5th percentile concentration for runoff samples from the National Stormwater Quality Database (https://bmpdatabase.org/national-stormwater-quality-database), Rainfall Region 1 (i.e. 95% of samples from that database exceed 0.05 mg/L).

Information: UPDATE: In April 2023 we received information on phoshorus concentrations in Minnesota stormwater runoff. We used that information to update the phosphorus credits. Detailed information is not provided here other than noting that 5th percentile TP concentrations in Minnesota exceed 0.1 mg/L

Summary statistics for data collected for Washington State TAPE GULD certification. **NOTE: These data are not to be applied to crediting for mtds in Minnesota. For mtd credits, link here (https://stormwater.pca.state.mn.us/index.php?title=Credits_for_manufactured_treatment_devices)**
Link to this table

Manufactured treatment device	Median inflow TP (mg/L)	Median inflow TSS (mg/L)	Number samples		TP Removal (%)					TSS removal (%)			
					Data with influent > 0.05 mg/L TP			TAPE analysis		All data			TAPE analysis
			Data with influent > 0.05 mg/L TP	Meeting TAPE criteria	Median	Mean	LCL	TAPE median	TAPE LCL	Median	Mean	LCL	TAPE median
Filterra System	0.090	43.5	17	10	69.0	66.8	59.0	78.5	69.2	89.5	86.2	82.8	89.3

Manufactured treatment device	Median inflow TP (mg/L)	Median inflow TSS (mg/L)	Number samples		TP Removal (%)					TSS removal (%)			
					Data with influent > 0.05 mg/L TP			TAPE analysis		All data			TAPE analysis
			Data with influent > 0.05 mg/L TP	Meeting TAPE criteria	Median	Mean	LCL	TAPE median	TAPE LCL	Median	Mean	LCL	TAPE median
Filterra Bioscape - see Filterra System													
StormFilter using PhosphoSorb Media	0.280	389	17	16	81.5	77.4	69.9	78.7	63.6	91.6	88.1	84.8	89.0
Up-Flo Filter w/Filter Ribbons	0.109	29	20	13	50.3	41.5	31.0	57.1	49.9	75	67.6	59.9	77.5
MWS-Linear Modular Wetland	0.103	44	24	16	61.3	60.6	52.5	63.3	54.0	81.9	76.6	71.2	82.9
BayFilter w/EMC Media[1]	0.160	53	12	10	68.6	64.0	59.4	68.6	58.2	89.3	86.1	81.1[2]	89.3
StormGarden Modular Stormwater Bio-filtration System	0.078	29	20	15	58.9	57.4	52.9	58.9	43.2	89.2	86.0	82.8	91.9
BioPod Biofilter	0.104	40	13	7	71.7	66.7	59.4	75.4	62.4	83.3	86.5	82.1	91.9
BoxlessBioPod Biofilter - see BioPod Biofilter													
FloGard Perk Filter	0.123	62.5	21	15	66.5	62.3	53.0; 58.6 without outlier	70.7	48.8 (60.6 without outlier)	80.6	74.7	68.5	81.1
The Kraken	0.142	53	14	10	74.5	71.9	63.9	83.6	71.3	90.6	87.4	77.5	90.7
Jellyfish Filter	0.338	134	23	18	75.2	73.6	68.2	71.0	66.8	86.2	80.0	74.1	78.4
StormTree biofiltration	0.118	38	27	29	62	57	51	68	61	93	92	90	92
Media Filtration System	Though this device is GULD certified, it is not used in Minnesota. We therefore did not analyze the data.												
Stormfilter using ZPG Media	Though this device is GULD certified, it is not used in Minnesota. We therefore did not analyze the data.												
ecoStorm plus	We have not received data for this device												

[1] Only data meeting TAPE inflow requirements was available.

[2] Six outflow concentrations were at the reporting level of 2.5 mg/L; we used half the reporting limit in our analysis

In Washington State, TAPE-certified practices receive 50 percent credit for TP and 80 percent credit for TSS. Some devices appear capable of removing higher percentages of these pollutants. We therefore created a tiered credit system in which higher TP removal credits may be given provided certain conditions are met. A tiered approach to crediting allows flexibility in selecting practices and associated conditions that may affect performance, such as influent water quality and operation and maintenance.

Data from the TERs indicate differing performance levels for each device. It is not possible to develop uniform credits across all devices. We therefore chose the following approach to crediting.

- TSS credit is determined as follows:
  - The lower 95th% confidence limit (LCL) for all samples from TAPE monitoring, calculated using Washington TAPE's Bootstrap Calculator or
  - the LCL for all samples from other monitoring that follows monitoring protocol described here (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds)#Protocol_for_monitoring), calculated using Washington TAPE's Bootstrap Calculator.
  - If the LCL is less than 80%, MPCA staff may assign a value of 80% if additional analysis and review indicates the device is likely to achieve 80% TSS removal under most storm runoff conditions. Factors considered in this determination include but are not limited to low influent TSS concentrations during monitoring, exceptionally small particle size in monitoring runoff, or laboratory analysis under conditions considered more representative of runoff than conditions that existed during field monitoring.
  - The TSS credit cannot exceed 85%
- Tier 1 - TP
  - Credit: 50 percent reduction
  - Conditions for receiving credit
    - Inspect manufactured treatment device a minimum of twice during year 1. Conduct inspections following manufacturer's instructions/recommendations (Click on links to information for the device). Use maintenance indicators provided by manufacturers to determine if maintenance is needed. Maintenance procedures should follow manufacturer's guidelines. After year 1, follow manufacturers inspection, operation, and maintenance schedule and procedures unless otherwise required or unless year 1 inspections indicate a need for increased inspection and/or operation and maintenance. Determine future inspection and maintenance schedules from findings during the first year of operation.
    - Comply with appropriate configurations and Use conditions from TAPE. These can be found on the individual device pages (see links below).
- Tier 2 - TP

- Credit:
  - based on the lower of the following:
    - the 95% LCL for samples with influent concentrations between 0.1 and 0.5 mg/L, calculated using Washington TAPE's Bootstrap Calculator, or
    - the 95% LCL for samples with influent concentrations between the 5th percentile TP concentration, as defined below, and 0.5 mg/L, calculated using Washington TAPE's Bootstrap Calculator, or
    - TP removal calculated using the equation TPR=(PPF∗TSSR) = (0.75∗TSSR) where PPF is the fraction of TP in particulate form, assumed to be 0.75 (75 percent) and TSSR is the 95% LCL for TSS.
- Conditions for receiving credit:
  - The Tier 2 credit cannot exceed 60% (if the Tier 2 value is 50% or less, calculated using the above methods, no Tier 2 value is assigned)
  - Must meet Tier 1 conditions.
  - DP should be 25 percent or less of TP. Since monitoring will not likely be implemented for these devices, we provide guidance below (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds)#Applicability_of_Tier_2_TP_credits) for determining if site conditions may affect the credit.
  - Inspect manufactured treatment device monthly during the frost free season for the first year of operation after construction. Conduct inspections following manufacturer's instructions/recommendations. Use maintenance indicators provided by manufacturers to determine if maintenance is needed. Maintenance procedures should follow manufacturer's guidelines.

The 5th percentile TP concentration represents a concentration which is exceeded in 95% of samples. This value is subject to change based on the best available data. Changes in the 5th percentile TP concentration will affect the Tier 2 TP credit. As of January, 2022, the National Stormwater Quality Database (https://bmpdatabase.org/national-stormwater-quality-database), EPA Rainfall Region 1, is used to estimate the 5th percentile TP concentration. This value is 0.05 mg-TP/L (n=598).

Information: UPDATE: In April 2023 we received information on phoshorus concentrations in Minnesota stormwater runoff. We used that information to update the phosphorus credits. Detailed information is not provided here other than noting that 5th percentile TP concentrations in Minnesota exceed 0.1 mg/L

- Tier 3 - TP
  - The lower of a) the two LCLs calculated for Tier 2 (see above) or b) TP removal using the LCL for TSS, a PP:TP ratio of 0.75, and calculated from Eq. 1 (see below (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds)#How_does_total_phosphorus_removal_correlate_with_concentrations_of_TSS_and_the_distribution_of_particulate_and_dissolved_phosphorus_in_runoff.3F)), if it exceeds 60%, plus specific design, construction, operation, maintenance, and assessment requirements described for the mtd device in the Minnesota Stormwater Manual. See the applicable mtd in this section of the manual (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds)#Derivation_of_TP_and_TSS_credits_for_specific_mtds).
  - A credit for dissolved phosphorus (DP) removal in addition to the Tier 2 credit if the device has an MPCA-approved mechanism for permanently retaining dissolved phosphorus (https://stormwater.pca.state.mn.us/index.php?title=MPCA-approved_mechanisms_and_values_for_removal_of_dissolved_phosphorus_from_stormwater_runoff) other than volume retention. The credit is determined by MPCA staff. The MPCA retains discretion at assigning higher or lower removal values for a specific device for DP based on available data.
  - A TP credit of 100% for runoff permanently retained by the device plus the Tier 2 credit for runoff not retained. See ***Protocol for assigning credits for phosphorus and total suspended solids (TSS) for manufactured treatment devices*** (https://stormwater.pca.state.mn.us/index.php?title=File:Protocol_for_assigning_credits_for_phosphorus_and_TSS_for_manufactured_treatment_devices_v_2.docx) for an example calculation. The credit is calculated as an instantaneous volume captured and infiltrated by the device into the underlying subsoil. Infiltration must be calculated as an average annual volume infiltrated using a method approved by the MPCA. Infiltration must meet the 48 hour drawdown requirement.
  - Conditions for receiving credit:
    - Must meet Tier 1 and Tier 2 conditions
    - Must meet any additional requirements for the applicable mtd defined in this section of the manual (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds)#Derivation_of_TP_and_TSS_credits_for_specific_mtds).

The adjacent table provides TSS and TP removal credits for mtds. This credit only applies to the water treated by the device. To calculate annual pollutant mass removal, the removal credit must be multiplied by the volume treated. Link here for information on determining annual volume to apply credit (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds)#Calculating_annual_volume_treated).

Information: Credits may be modified based on additional analysis and information.

To receive the credit(s), follow use conditions for each device, found at the appropriate link below.

- BayFilter w/EMC Media
- BioPod Biofilter
- BoxlessBioPod Biofilter
- ecoStorm plus
- Filterra Bioscape
- Filterra System
- FloGard Perk Filter
- Media Filtration System
- MWS-Linear Modular Wetland
- StormFilter using PhosphoSorb Media
- StormFilter using ZPG Media
- StormGarden Modular Stormwater Bio-filtration System
- The Kraken
- Up-Flo Filter w/Filter Ribbons
- Jellyfish Filter

Caution: Total phosphorus credits only apply to the volume of water being treated by a device

Credits for manufactured treatment devices. The credits are expressed as a percent removal.
Link to this table

Device	Manufacturer	Total phosphorus (%)			Total suspended solids (%)
		Tier 1 (Basic)	Tier 2	Tier 3	
BayFilter w/EMC Media	BaySaver Technologies, Inc	50	59.4		85
BioPod Biofilter with Curb Inlet	Oldcastle Infrastructure, Inc.	50	60		82
ecoStorm plus	Watertectonics, Inc.	50			
Filterra Bioscape	CONTECH Engineered Solutions, LLC.	50	60		82
Filterra System	CONTECH Engineered Solutions, LLC.	50	60		82
FloGard Perk Filter	Oldcastle Infrastructure, Inc.	50	53		80
Media Filtration System	CONTECH Engineered Solutions, LLC.	50			
MWS-Linear Modular Wetland	Bio Clean Environmental Services, Inc. (A Forterra Company)	50	54		80
StormFilter using PhosphoSorb Media	CONTECH Engineered Solutions, LLC.	50	60	70	85
Stormfilter using ZPG Media	CONTECH Engineered Solutions, LLC.	50			80
StormGarden Modular Stormwater Bio-filtration System	Environmental Solutions	50	53		83
The Kraken	CONTECH Engineered Solutions, LLC.	50	58		80
Up-Flo Filter w/Filter Ribbons	Hydro International	50			80
Jellyfish	Contech	50	56		80
StormTree biofiltration	StormTree	50	60		85

Derivation of TP and TSS credits for specific mtds

Information: Credits may be modified based on additional analysis and information.

This section provides summaries of TAPE monitoring data for each device, including derivation of TSS and TP credits.

Filterra System

Tier 1 TP = 50%; Tier 2 TP = 59%; no Tier 3 credit; TSS = 82%

- Does the device have a known mechanism for retaining dissolved phosphorus - No
- Does TP removal percentage decrease as influent TP concentration decreases below 0.1 mg/L - Yes
  - Median removal for influent >= 0.1 mg/L - 78.5% (n=10); influent < 0.1 - 44% (n=11)
  - p = 0.0003
- 95% boot strap LCLs: 52% for all data (22 samples), 58.9% for data with influent concentrations > 0.05 mg/L (17 samples), and 69% for TAPE analyzed data (10 samples)
  - Recommended Tier 2 value is the LCL for all data with inflow concentrations greater than 0.05 mg/L = 59% since this value is lower than the TAPE LCL and represents a lower bound for TP inflow concentrations
  - Because there is no known mechanism for removing DP, no Tier 3 credit is given
- TSS removal credit is the LCL for all data = 82%, since this is lower than the TAPE value of 86%
- Observations
  - Median influent TSS and TP concentrations (43.5 and 0.09 mg/L, respectively) are within expected ranges but on the low end of those ranges
  - Orthophosphate data was collected but influent concentrations for all but two samples were at or below the reporting level (0.01 mg/L)

StormFilter using PhosphoSorb Media

Tier 1 TP = 50%; Tier 2 TP = 60%; Tier 3 credit = 70%; TSS = 85%

- Does the device have a known mechanism for retaining dissolved phosphorus - Yes
- Does TP removal percentage decrease as influent TP concentration decreases below 0.1 mg/L - Cannot determine this since only one sample was less than 0.1 mg/L. It does not appear removal is affected by inflow concentrations for the range of influent concentrations observed. There is one very low removal value that appears to be an outlier.
- 95% boot strap LCL is 69.7% for all data and 63.6% for TAPE analyzed data
  - Recommended Tier 2 value is 60% based on the restriction of 60% removal for Tier 2
  - Recommended Tier 3 value = 70%.
    - The practice contains perlite, which contains aluminum oxides that can sorb dissolved phosphorus.
    - Total phosphorus removal by the device in TAPE studies was greater than for other mtds and showed removal of dissolved P (SRP), although DP concentrations were low (typically less than 0.05 mg/L). TP removal may have been influenced by very high TSS influent concentrations (>300 mg/L).
    - In a study conducted at Mitchell Community College in North Carolina (https://swbmpvwrrc.wp.prod.es.cloud.vt.edu/wp-content/uploads/2017/10/Filter_Application_StormFilter-w-Phosphosorb-media_Item-4.pdf) (2012), median and mean removal of DP was 69 and 74 percent, respectively. Sample size was 5.
    - In a laboratory study by Lenart et al., the media achieved DP removal of 70% for 1000 pore volumes and 55% for 2000 pore volumes. Influent consisted of 0.5 mg/l Potassium Dihydrogen Phosphate
    - In a study conducted by Ma et al. (https://ascelibrary.org/doi/abs/10.1061/(ASCE)IR.1943-4774.0000291) (2011) and published in the Journal of Irrigation and Drainage Engineering, adsorption isotherms for the engineered media (later incorporated into the Phosphosorb device) indicated significant removal of dissolved phosphorus. Removal rates were approximately 50% up to 500 pore volumes and 70% after 2000 pore volumes. Influent concentration was 0.5 mg/L DP.

    - Conclusion: Studies suggest Phosphorsorb can achieve long-term DP removal of 30 to 50%.
    - Currently mtd TP removal values in the Manual are based on the assumption that particulate P accounts for 75% of TP. Assuming a 30% removal value and a DP fraction of 25%, and with a TP removal of 60% for this device based only on PP removal, the TP removal is 70% (60 + 10).
- TSS removal credit is the maximum credit of 85% based on an LCL of 86% for all data
- Observations
    - Median influent TSS concentration was very high (389 mg/L) and the median particle size (100 microns) was high. These may account for the high removal rates for TSS.
    - Median influent TP concentration was 0.28 mg/L, which is typical of Minnesota stormwater runoff
    - Dissolved phosphorus, orthophosphate, or soluble reactive phosphorus were sampled but most samples were below reporting limits. Analyzing data for six samples with detectable concentrations, median removal of DP was 32% and mean removal was 39% using the reporting limit and 54% using half the reporting limit.

Up-Flo Filter w/Filter Ribbons

Tier 1 TP = 50%; No Tier 2 or Tier 3 value recommended; TSS = 80%

- Does the device have a known mechanism for retaining dissolved phosphorus - No
- Does TP removal percentage decrease as influent TP concentration decreases below 0.1 mg/L - Yes
    - Median removal for influent >= 0.1 mg/L - 56.1% (n=11); influent < 0.1 - 10.5% (n=13)
    - p = 0.001
- The 95% boot strap TP-removal LCL for TAPE-analyzed data was 49.9%. The LCL for all data was 19.1%, but there appeared to be multiple outliers in the dataset. The TAPE approval document noted the small median particle size (11 microns) in runoff to the device, citing multiple times when the device became clogged and required maintenance: "The system was subjected to atypical sediment loading and needed to be serviced after 4 months, or 12.7% of a water year. Monitoring personnel observed similar sediment loading and blinding issues with other systems evaluated at the Test Facility. The runoff from the Test Facility is not expected to be characteristic of other urban runoff applications". We therefore recommend using the TAPE LCL of 50% for Tier 1 TP credit.
- No Tier 2 or Tier 3 credit is given for this device based on data collected for TAPE certification.
- TSS credit is the TAPE default of 80% since the LCL was less than 80%
- Observations
    - Median influent TSS and TP concentrations (29 and 0.11 mg/L, respectively) are within expected ranges but on the low end of those ranges
    - Orthophosphate data was collected but the median influent concentration was at the reporting limit (0.01 mg/L). For samples with detectable influent concentrations, the median removal was 0% and the mean removal was -9%.

MWS-Linear Modular Wetland (https://stormwater.pca.state.mn.us/index.php?title=Contech_MWS-Linear_Modular_Wetland)

Tier 1 TP = 50%; Tier 2 = 53%; No Tier 3 value; TSS = 80%

- Does the device have a known mechanism for retaining dissolved phosphorus - No
- Does TP removal percentage decrease as influent TP concentration decreases below 0.1 mg/L - No
    - Median removal for influent >= 0.1 mg/L - 62% (n=11); influent < 0.1 - 66% (n=12)
    - p = 0.43
    - There is one value that appears to be an outlier
- The 95% boot strap LCL is 52.7% for data with influent concentrations greater than 0.05 mg/L and 54.1% for TAPE analyzed data. The recommended Tier 2 value is 53%.
- We do not recommend a specific Tier 3 value based on this analysis
- TSS credit is the TAPE default of 80% since the LCL was less than 80%
- Observations
    - Median influent TSS and TP concentrations (44 and 0.10 mg/L, respectively) are within expected ranges but on the low end of those ranges
    - Orthosphosphate data was collected. During the first year of sampling influent concentrations were typically at or below the reporting limit (0.01 mg/L). In the second year of sampling there were seven monitoring events with relatively high influent OP concentrations (0.06-0.96 mg/L). Removal of OP for these events ranged from 16 to 88 percent, with a median removal of 59 percent.

BayFilter w/EMC Media

Tier 1 TP = 50%; Tier 2 = 59%; no Tier 3 credit; TSS = 85%

- Does the device have a known mechanism for retaining dissolved phosphorus - No
- Does TP removal percentage decrease as influent TP concentration decreases below 0.1 mg/L - Cannot determine this since only one sample was less than 0.1 mg/L. Of the 12 samples collected, the three lowest removal percentages were for influent concentrations less than 0.15 mg/L.
- The 95% boot strap LCL is 59.4% for all data and 58.2% for TAPE analyzed data
    - Recommended Tier 2 value is 58%
    - Because there is no known mechanism for removing DP, no Tier 3 credit is given
- TSS credit is 85%. This is the LCL for all data. There appears to be one outlier for a sample having a low influent concentration. If this outlier is removed, the LCL is 87%.
- Observations
    - Median influent TSS and TP concentrations (53 and 0.16 mg/L, respectively) are within expected ranges
    - Orthophosphate data was not available in the TER we received.

StormGarden Modular Stormwater Bio-filtration System

Tier 1 TP = 50%; Tier 2 = 52%; no Tier 3 credit; TSS = 83%

- Does the device have a known mechanism for retaining dissolved phosphorus - No
- Does TP removal percentage decrease as influent TP concentration decreases below 0.1 mg/L - No

Contech StormFilter using PhosphoSorb Media

Information: *Reference to specific commercial products, processes, or services by trade name, trademark, service mark, manufacturer, or otherwise does not constitute or imply endorsement, recommendation, or favoring by the Minnesota Pollution Control Agency.*

Contech's StormFilter using PhosphoSorb Media is an engineered media filtration system designed to filter pollutants from stormwater runoff. It is classified as a **manufactured treatment device** (mtd).

This page provides information on pollutant removal credits for StormFilter using PhosphoSorb Media, links to supporting information, and links to information on system design, inspection, operation, and maintenance.

Contents

- 1 TP and TSS credits
  - 1.1 Configurations
  - 1.2 Use conditions
  - 1.3 Data analysis
  - 1.4 Inspection, operation, and maintenance
- 2 Links
- 3 References

TP and TSS credits

When conditions described in this section are met, applicable Contech StormFilter using PhosphoSorb Media systems are approved for the following removals for total suspended solids (TSS) and total phosphorus (TP).

- TSS: 85 percent removal
- TP: Tier 1
  - Credit: 50 percent removal
  - Conditions for receiving credit
    - Inspect manufactured treatment device a minimum of twice during year 1. Conduct inspections following manufacturer's instructions/recommendations and any additional instructions listed in this section (https://stormwater.pca.state.mn.us/index.php?title=Contech_StormFilter_using_PhosphoSorb_Media#Use_conditions). Use maintenance indicators provided by manufacturers to determine if maintenance is needed. Maintenance procedures should follow manufacturer's

guidelines. After year 1, follow manufacturers inspection, operation, and maintenance schedule and procedures unless otherwise required or unless year 1 inspections indicate a need for increased inspection and/or operation and maintenance.
    - Comply with appropriate configurations and Use conditions from TAPE.
    - Comply with appropriate configurations (https://www.conteches.com/Portals/0/Documents/Design%20Guides/StormFilter-Config-Guide.pdf?ver=2018-05-16-083627-317) and Use conditions (https://stormwater.pca.state.mn.us/index.php?title=Contech_StormFilter_using_PhosphoSorb_Media#Use_conditions)
- TP: Tier 2
  - Credit: 60 percent removal
  - Conditions for receiving credit
    - Must meet Tier 1 conditions.
    - DP should be 25 percent or less of TP. For a discussion of conditions where DP is likely to exceed 25% of TP, link here (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds)#Applicability_of_Tier_2_TP_credits). TP removal should be adjusted when DP fractions exceed 25%, as described at the link provided above.
    - Inspect manufactured treatment device monthly during the frost free season for the first year of operation after construction. Conduct inspections following manufacturer's instructions/recommendations. Use maintenance indicators provided by manufacturers to determine if maintenance is needed. Maintenance procedures should follow manufacturer's guidelines. Determine future inspection and maintenance schedules from findings during the first year of operation.
  - Recommended Tier 3 value = 70%.
    - The practice contains perlite, which contains aluminum oxides that can sorb dissolved phosphorus.
    - Total phosphorus removal by the device in TAPE studies was greater than for other mtds and showed removal of dissolved P (SRP), although DP concentrations were low (typically less than 0.05 mg/L). TP removal may have been influenced by very high TSS influent concentrations (>300 mg/L).
    - In a study conducted at Mitchell Community College in North Carolina (https://swbmpvwrrc.wp.prod.es.cloud.vt.edu/wp-content/uploads/2017/10/Filter_Application_StormFilter-w-Phosphosorb-media_Item-4.pdf) (2012), median and mean removal of DP was 69 and 74 percent, respectively. Sample size was 5.
    - In a laboratory study by Lenart et al., the media achieved DP removal of 70% for 1000 pore volumes and 55% for 2000 pore volumes. Influent consisted of 0.5 mg/l Potassium Dihydrogen Phosphate
    - In a study conducted by Ma et al. (https://ascelibrary.org/doi/abs/10.1061/(ASCE)IR.1943-4774.0000291) (2011) and published in the Journal of Irrigation and Drainage Engineering, adsorption isotherms for the engineered media (later incorporated into the Phosphosorb device) indicated significant removal of dissolved phosphorus. Removal rates were approximately 50% up to 500 pore volumes and 70% after 2000 pore volumes. Influent concentration was 0.5 mg/L DP.
    - Conclusion: Studies suggest Phosphorsorb can achieve long-term DP removal of 30 to 50%.
    - Currently mtd TP removal values in the Manual are based on the assumption that particulate P accounts for 75% of TP. Assuming a 30% removal value and a DP fraction of 25%, and with a TP removal of 60% for this device based only on PP removal, the TP removal is 70% (60 + 10).
  - Conditions for receiving credit
    - Must meet Tier 1 and Tier 2 conditions
    - Tier 2 and Tier 3 credits assume PP:TP ratio of 0.75:1 and no dissolved phosphorus removal

For more information on credits, see TP and TSS credits and guidance for manufactured treatment devices (mtds)

Configurations

For a discussion of StormFilter configurations, link here (https://www.conteches.com/Portals/0/Documents/Design%20Guides/StormFilter-Config-Guide.pdf?ver=2018-05-16-083627-317).

Use conditions

To receive the full credit, StormFilter systems must comply with the following conditions.

1. Design, assemble, install, operate, and maintain StormFilter systems in accordance with applicable manuals (https://www.conteches.com/technical-guides/search?filter=ZTZ0OPRML1).
2. The maximum flow rates through the devices are specified below.
    1. 8.35 gpm/cartridge for 12 inch high cartridges
    2. 12.53 gpm/cartridge for 18 inch high cartridges
    3. 18.79 gpm/cartridge for 27 inch high cartridges
3. Systems are designed to treat a specified water quality volume or annual average runoff volume. The annual average runoff treated can be determined using methods that are specified here (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds)#Calculating_annual_volume_treated).
4. Each site plan must undergo Contech StormFilter review before approval of the unit for site installation.
5. StormFilter media shall conform to the specifications described in Specifications and shall be sourced from Contech Engineered Solutions, LLC with no substitutions.
6. Follow maintenance procedures given in the most recent version of the StormFilter Operation and Maintenance Manual (https://www.conteches.com/Portals/0/Documents/Maintenance%20Guides/StormFilter-Maintenance-Guide.pdf?ver=2018-05-31-143302-143).
7. Install the StormFilter in such a manner that flows exceeding the maximum StormFilter operating rate are conveyed around the StormFilter media and will not resuspend captured sediment.
8. Discharges from the StormFilter units shall not cause or contribute to water quality standards violations in receiving waters.

- When applicable, adhere to use conditions provided in Washington State Department of Ecology's report (Ecology's Conditions of Use) GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS) AND PHOSPHORUS TREATMENT For CONTECH Engineered Solutions Stormwater Management StormFilter® with PhosphoSorb® media (https://fortress.wa.gov/ecy/ezshare/wq/tape/use_designations/STORMFILTERphosphosorbCONTECHguld.pdf). Note that some information in this report is specific to Washington State and not applicable to Minnesota.

Data analysis

Credits apply only to the water being treated by a device. The applicable treatment volume must be determined using one of the methods described here (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds)#Calculating_annual_volume_treated).

The Tier 1 credit equals the TAPE-approved credits. Tier 2 credit was determined by analyzing water quality data collected at ZigZag, Oregon. The site consisted of transportation land use with 0.063 acres of impervious draining to the device. The system contained one 18-inch StormFilter cartridge with PhosphoSorb media operating at a specific flow rate 1.67 gpm/ft^2 or 12.5 gpm per 18-inch tall cartridge.

MPCA compiled data from Appendix D of the report The Stormwater Management StormFilter® PhosphoSorb® at a Specific Flow Rate of 1.67 gpm/ft2 General Use Level Designation Technical Evaluation Report. Below are summary statistics for the device.

- Median TP inflow - 0.28 mg/L
- Median TP removal (all data with concentrations > 0.05 mg/L) - 81.5%
- 95% lower confidence limit TP removal (all data with concentrations > 0.05 mg/L) - 69.9%
- Median TP removal (data meeting TAPE criteria) - 78.7%
- 95% lower confidence limit TP removal (data meeting TAPE criteria) - 63.6%
- Median TSS removal (all data) - 91.6%
- 95% lower confidence limit TSS removal (all data) - 84.8%

TAPE means and medians represent values meeting TAPE criteria for TP (inflow concentrations of 0.1 to 0.5 mg/L) and TSS (inflow concentrations greater than 20 mg/L). Of the 22 samples, TAPE medians and means represent 16 samples for TP and 17 samples for TSS.

The Tier 3 credit of 70% is based on the following.

- PP removal of 60%, assuming PP is 75% of TP and TSS removal is 80% (80% * 75% = 60%)
- DP removal is 40%. Assuming DP is 25% of TP, the DP credit is (40% * 25%) equals 10%
- TP removal is PP removal plus DP removal equals 60% + 10% = 70%
- DP removal is based on testing of the phosphosorb media, which contains expanded aluminum (Ma et al., 2011 (https://www.researchgate.net/publication/276965524_Orthophosphate_Adsorption_Equilibrium_and_Breakthrough_on_Filtration_Media_for_Storm-Water_Runoff_Treatment)).

Inspection, operation, and maintenance

Meet the conditions specified for the appropriate TP and/or TSS credit (https://stormwater.pca.state.mn.us/index.php?title=Contech_StormFilter_using_PhosphoSorb_Media#TP_and_TSS_credits).

Meet the conditions specified in StormFilter Inspection and Maintenance Procedures (https://www.conteches.com/Portals/0/Documents/Maintenance%20Guides/StormFilter-Maintenance-Guide.pdf?ver=2018-05-31-143302-143), unless conditions for the appropriate TP and/or TSS credit (https://stormwater.pca.state.mn.us/index.php?title=Contech_StormFilter_using_PhosphoSorb_Media#TP_and_TSS_credits) are more stringent.

Links

- The Stormwater Management StormFilter (https://www.conteches.com/stormwater-management/treatment/stormwater-management-stormfilter)
- Technical Guides (https://www.conteches.com/technical-guides/search?filter=ZTZ0OPRML1)
- Brochure (https://www.conteches.com/Portals/0/Documents/Brochures/StormFilter-Bro.pdf?ver=2019-01-08-094250-603)
- Case studies (https://www.conteches.com/knowledge-center/case-studies/search?filter=FGZFUFMLZE)
- Sizing Methodologies for the Stormwater Management StormFilter (https://www.conteches.com/Portals/0/Documents/Design%20Guides/RS-0041.pdf?ver=2018-05-16-083626-913)
- Project design worksheets (https://www.conteches.com/start-a-project/project-design-worksheets/stormwater-treatment)
- Video link (https://www.youtube.com/watch?v=wPyH-bsTJkw)

- Filter media options (https://www.conteches.com/stormwater-management/treatment/filter-media-options)

References

- Ma, J., J. H. Lenhart, K. Tracy. 2011. Orthophosphate Adsorption Equilibrium and Breakthrough on Filtration Media for Storm-Water Runoff Treatment. Journal of Irrigation and Drainage Engineering 137(4):244-250. DOI:10.1061/(ASCE)IR.1943-4774.0000291.

Retrieved from "https://stormwater.pca.state.mn.us/index.php?title=Contech_StormFilter_using_PhosphoSorb_Media&oldid=67083"

Search

This page was last edited on 15 February 2023, at 16:47.

© 2023 by Minnesota Pollution Control Agency • Powered by MediaWiki

Amira Victoria Planting Estimate:

This estimate is for the plantings in the enhanced wetland buffer.

TREES	Common/Botanical	CONT	Quantity	Unit Cost	Total
AB2	Black Maple / Acer nigrum	3" CAL. B&B	5	$ 656.00	$ 3,280.00
AS	Sugar Maple / Acer saccharum	3" CAL. B&B	5	$ 656.00	$ 3,280.00
RB	River Birch / Betula nigra	3" CAL. B&B	14	$ 656.00	$ 9,184.00
CO	Shagbark Hickory / Carya ovata	3" CAL. B&B	9	$ 656.00	$ 5,904.00
QB	Swamp White Oak / Quercus bicolor	3" CAL. B&B	11	$ 656.00	$ 7,216.00
QP	American Dream\U+00AE Oak / Quercus bicolor 'JFS-KW12'	3" CAL. B&B	5	$ 656.00	$ 3,280.00
QM2	Burr Oak / Quercus macrocarpa	3" CAL. B&B	1	$ 656.00	$ 656.00
				Total Overstory Trees:	**$ 32,800.00**
EVERGREEN TREES	**Common/Botanical**	**CONT**	**Quantity**	**Unit Cost**	**Total**
PK2	Eastern Larch / Larix laricina	7` B&B	12	$ 656.00	$ 7,872.00
				Total Evergreen Trees:	**$ 7,872.00**
ORNAMENTAL TREES	**Common/Botanical**	**CONT**	**Quantity**	**Unit Cost**	**Total**
AG2	Autumn Brilliance Serviceberry / Amelanchier x grandiflora `Autumn Brilliance`	#20 CLUMP	3	$ 605.00	$ 1,815.00
CV	Thornless Cockspur Hawthorn / Crataegus crus-galli inermis TM	1.5" Cal. B&B	1	$ 605.00	$ 605.00
OV	American Hophornbeam / Ostrya virginiana	1.75" Cal B&B	3	$ 605.00	$ 1,815.00
				Total Ornamental Trees:	**$ 4,235.00**
SHRUBS	**Common/Botanical**	**Size**	**Quantity**	**Unit Cost**	**Total**
CI	Isanti Redosier Dogwood / Cornus sericea `Isanti`	#5 CONT	34	$ 46.00	$ 1,564.00
VC	High Bush Cranberry / Viburnum trilobum	#5 CONT	24	$ 46.00	$ 1,104.00
				Total Shrubs:	**$ 2,668.00**
Plugs	**Common/Botanical**	**Size**	**Quantity**	**Unit Cost**	**Total**
	Carex Plug Mix	4" Pot	1,249	$ 6.70	$ 8,368.30
				Total Plugs:	**$ 8,368.30**
				Total Buffer Planting:	**$ 55,943.30**