August 8, 2018

Ms. Cindy Walsh
Operations & Recreation Director
City of St. Louis Park
3700 Monterey Drive
St. Louis Park, MN 55416

Re: 90% Design Plans – Westwood Hills Nature Center Linear Stormwater Feature Project City of St. Louis Park

Dear Ms. Walsh:

Attached please find the 90% design plans for the Westwood Hills Nature Center (WHNC) Linear Stormwater Feature Project. The Bassett Creek Watershed Management Commission (BCWMC) is funding the WHNC Linear Stormwater Feature Project (BCWMC CIP project WST-2: Westwood Lake Water Quality Improvement Project) through a 2019 ad valorem levy (via Hennepin County). Per the future cooperative agreement between the City of St. Louis Park and the BCWMC, the city is to construct the project, with plans and specifications subject to approval by the Commission. Also, per the future cooperative agreement, the 90% design plans for this project must be submitted to the BCWMC for review and approval. If the attached 90% plans meet the city's approval, we recommend submitting them, along with this letter, to the BCWMC for inclusion in the meeting packet for their August 16th meeting. Barr staff will present the 90% plans to the BCWMC at the meeting and answer any questions from the BCWMC.

The remainder of this letter presents information about the feasibility study, the design features of the project, and approval/permitting needs.

Feasibility Study Summary and Selected Project

The BCWMC completed the *Feasibility Report for Westwood Lake Water Quality Improvement Project (May 2018)* to evaluate options improving water quality at the WHNC project site. The BCWMC selected completing concept 3 which is a linear stormwater feature on the north side of the building. The selected project will provide water quality improvement by (1) providing additional stormwater runoff storage, and (2) reducing runoff volume, and sediments and nutrients in the water, through infiltration, evaporation, or evapotranspiration. The project will also include educational benefits through signage, pedestrian bridges, and interactive pumps. WHNC receives over 40,000 visitors per year, many of whom are part of a programmed group. The City expects the number of visitors to rise, with the new facility being nearly five times the size of the existing facility. WHNC staff will develop educational curriculum based on the bog and the hydrologic cycle represented through the linear stormwater feature.

Design features - 90% plans

The primary design features of the proposed work, as shown on the attached 90% plans, include:

1. Pumps, storm sewer, and structures. The storm sewer and structures will store stormwater runoff from a majority of the building roof and the surrounding areas on the north side of the building. Solar- and hand-powered pumps will be used to pump the water from the underground storage

to the upstream end of the constructed intermittent stream. Solar- and hand-powered pumps will be located in one area on the site, on a concrete patio. The pump patio will also include a large sign describing the hydrologic cycle and how the system mimics that cycle. A draft version of that sign attached. A rain gauge and manhole will be installed near the pump patio. There will be a float in the manhole that will rise out of the manhole, indicating how much water is in the underground storage. Staff will be able to measure, or have children measure, the amount of rainfall in the rain gauge on a daily basis, and equate that to how full the storage pipes are. Staff can also create curriculum about the hydrologic cycle, and illustrate concepts like infiltration and evaporation with the system. The solar pump will operated only when the sun is shining. This is another opportunity to educate children, and adults, about solar power and the pump and solar power operates. The building will also have solar panels on the roof, which allow for further conversations and teaching opportunities. In some weather, the system will be dry. This provides further ways to educate visitors regarding droughts and extreme weather conditions.

- 2. Intermittent stream and small lined ponds. The runoff and pumped water will flow through a series of lined ponds, stream sections, and trench drains at three locations. At the upstream end, the water will flow from the pump outlets into a V-shaped trough; the water will then drop from the trough into the upper pond. The pond will 12 inches deep and the bottom will be lined. When the pond is full, water will overflow from the pond, flow over a grade control structure, into a steep stream section which transitions into a shallow slope stream section. At the end of the streawm, water will flow through a trench drain and drop from the trench drain into the lower pond. Water will flow over the lower pond grade control structure. The stream channel downstream of the lower pond is similar to the stream channel upstream of the lower pond. There is a second sidewalk crossing at the downstream end of the channel. The water will flow through the trench drain, into a catch basin structure, and be returned to the underground storage.
- 3. Bog. A bog will be created near the building, adjacent to the lower pool. The bog is a modification from the feasibility study, but it furthers the BCWMC goals of increasing water quality treatment and providing educational opportunities, as well as unique habitat. The water source for the bog will be the solar pump that will pump water from the underground storage to the bog. Education signage will be included at the east end of the bog. The signage will be around three feet wide by two feet tall, and the content will define a bog, how it forms, and plant and animal species native to bogs. A draft of the sign is attached. In addition to the bog sign, the nature center staff plan to build a curriculum around bogs to teach children more about the habitat.
- 4. Access points. The stream will have several access points for people to explore. Access will be achieved through stone steps leading from sidewalks to the bottom of the stream.
- 5. System overflow. When the underground storage and above ground sand filter area are full, water will overflow into a biofiltration basin to the west. If the biofiltration basin is full, water will overtop the trail to the west and flow into Turtle Pond or down to Westwood Lake. The building

floor elevation is 896.0. The overflow into the biofiltration basin is 893.0, and the overflow over the trail is 893.4.

Opinion of cost

The table below summarizes our opinion of costs, based on the 90% design plans:

Table 1 Opinion of Cost Summary

Item Description	Cost
Project costs eligible for BCWMC reimbursement:	
Mobilization and Erosion Control	\$14,500
Earthwork	\$10,900
Upper and Lower Ponds	\$ 7,850
Sidewalk Crossings with Drop Structures	\$10,000
Storm Sewer (underground storage)	\$19,250
Storm Structures	\$18,500
Channel Rock and Access Points	\$76,200
Bog Soil, Plants, Liner, and Railing	\$36,200
Trees, Shrubs, Herbaceous Plants, and VRSS	\$24,600
Pumps, Solar Panels, Structure, Concrete Pad	\$20,100
Signage	\$ 6,000
Total estimated construction costs	\$244,100
Contingency (+10%)	\$24,400
Engineering, Design, Construction Observation costs	\$ 81,000
Total construction and engineering costs	\$349,500 ⁱ

¹ This opinion of cost (Class 1, 90% design completion per ASTM E 2516-06) is based on partially complete designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Total Project Cost as the project is defined is -10% to +10%. The accuracy range is based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency. Operation and Maintenance costs are not included.

Per the future cooperative agreement between the city and the BCWMC, the BCWMC's total reimbursement for this project may not exceed \$404,500, less Commission expenses. Commission expenses are expected to be around \$53,500, leaving \$351,000 for engineering design and construction expenses. The total estimated construction and engineering costs are within the reimbursable costs allowed for this project.

Approvals/permit requirements

In addition to BCWMC approval of the plans, other permits/approvals will be required for this project.

The project will not include any work below the Westwood Lake ordinary high water level (OHWL), so a MDNR Public Waters Work Permit is not required.

A USACE joint permit is not required.

A Minnesota Pollution Control Agency (MPCA) Construction Stormwater General Permit is required as part of the larger project and will be obtained by the general contractor after the city awards the project. In addition, a stormwater pollution prevention plan (SWPPP) will be included in the construction drawings.

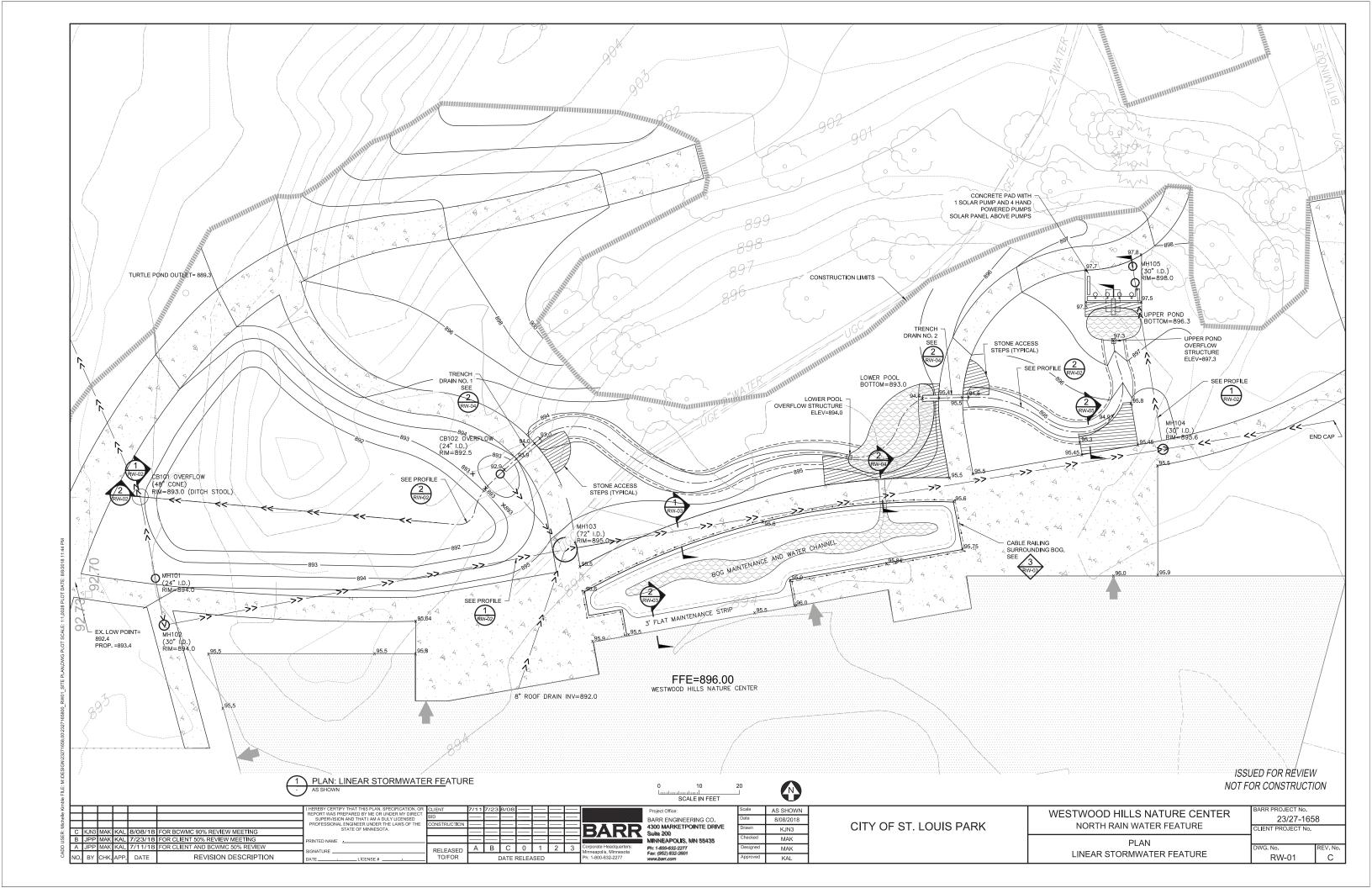
Recommendations

We recommend that the city request 1) BCWMC approval of the 90% drawings, and 2) BCWMC authorization for the city to proceed with 100% plans and contract documents.

If you have any questions, please contact me at 952-832-2724 or mkimble@barr.com. Sincerely,

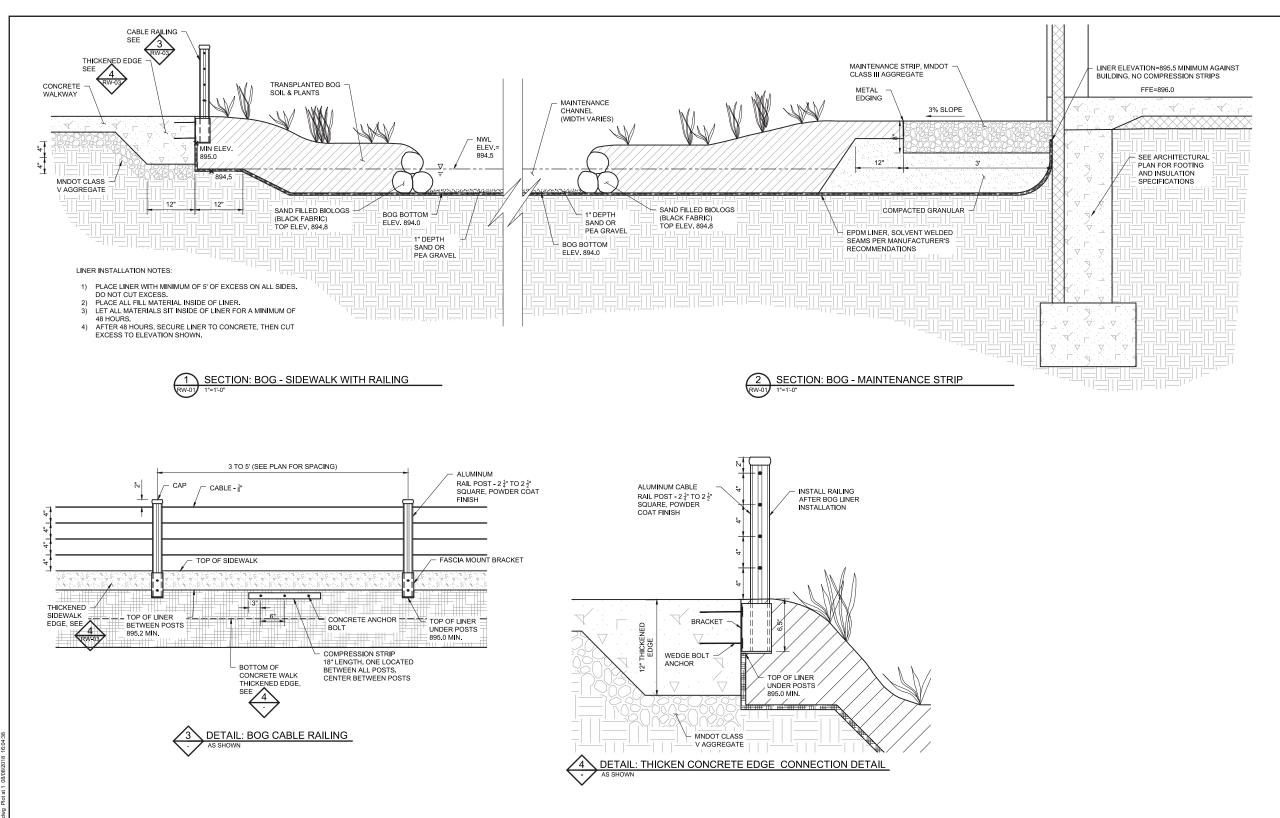
Michelle Kimble, P.E.

Sr. Civil Engineer



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NOT FOR CONSTRUCTION

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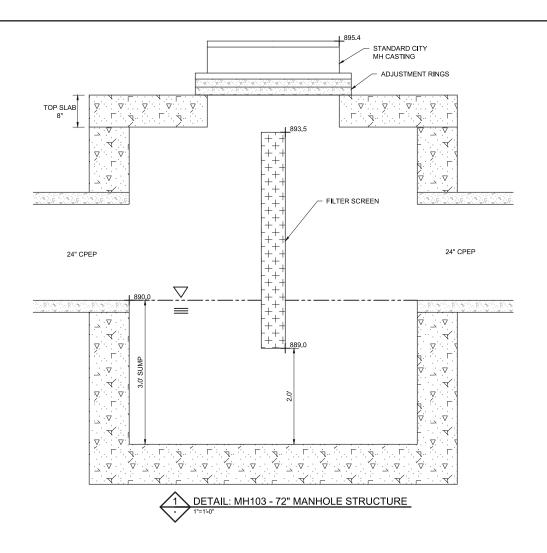
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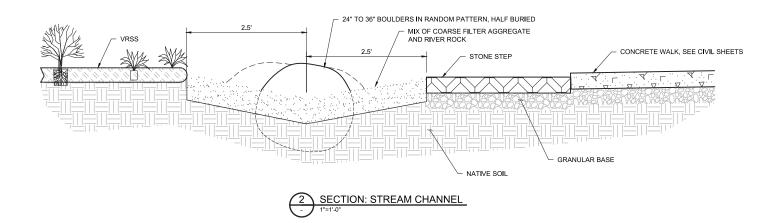
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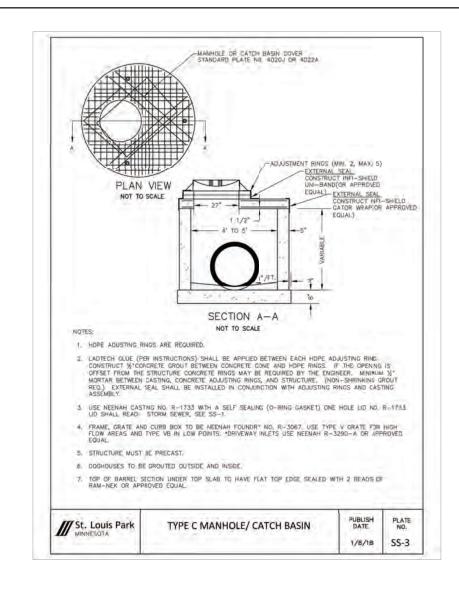
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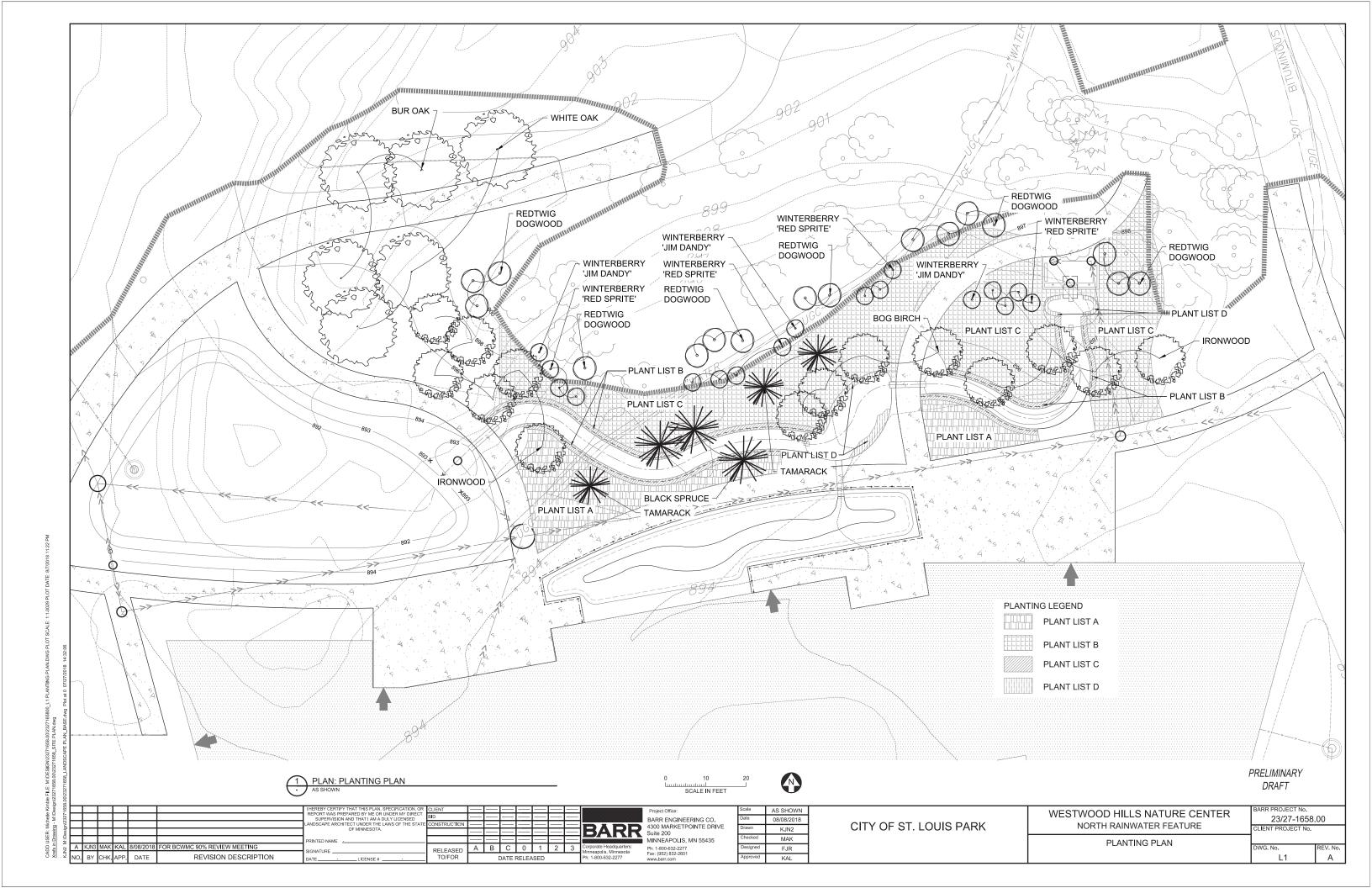




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Zone B Plants	e B Plan	its
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COMMOM NAME	SCIENTIFIC NAME	QUANTITY	SPACING	SIZE
Sweet flag	Acorus americanus			
Marsh marigold	Caltha palustris			
Fringed sedge	Carex crinita			
Tussock sedge	Carex stricta			
Rattlesnake manna grass	Glyceria canadensis			1
Blue flag iris	Iris versicolor			
Cardinal flower	Lobelia cardinalis			
Green bulrush	Scirpus atrovirens			

COMMOM NAME Columbine Aquillegia conadensis Swamp milkweed Butterfly weed Asclepias incarnata Butterfly weed Asclepias tuberosa Whorled milkweed Asclepias verticillata Large-leaved aster Aster macrophyllus Sideoats grama Bouteloua curtipendulo Plains oval sedge Carex brevior Turtlehead Chelone globro	QUANTITY	SPACING	SIZE	
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Turtlehead Chelone globra				
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Flat-topped aster Doellingeria umbeliata				
Narrow-leaved coneflower Echinocea angustifolia				Ι
Flowering spurge Euphorbia corollata				
Large-leaved aster Eurybia macrophylla				
Joe-pye weed Eutrochium maculatum				_
Wild strawberry Fragaria virginiana				_
Wild geranium Geranium maculatum				_
Sneezeweed Helenium autumnale				_
Hispid sunflower Helianthus hirsutus				_
Common ox-eye Heliopsis helianthoides				_
Rough blazing star Liatris aspera				_
Meadow blazing star Liatris liquiistylis				_
Tall blazing ster Liatris pycnostochya				_
Turk's cap lily Lilium michiganense				_
Great blue lobelia Lobelia siphilitica				_
False solomon's seal Maianthemum racemosum		-		_
Starry solomon's seal Maianthemum stellatum				_
Golden ragwort Packera aurea				_
Woodland phlox Phlox divaricata				_
Obedient plant Physostegia virginiana				_
Mountain mint Pycnanthemum virginianum				
Zig zag goldenrod Solidago flexicaulis				_
Stiff goldenrod Salidago rigida				_
Smooth aster Symphyotrichum laeve				_
Azure aster Symphyotrichum oolentangie.	nse			_
Arrow-leaved aster Symphyotrichum urophyllum				_
Tall meadow rue Thalictrum dasycorpum				_
Hoary vervain Verbeno stricto				Ξ
Culver's root Veronicastrum virginicum		7		
Heart-leaved Alexander Zizia aptera				_

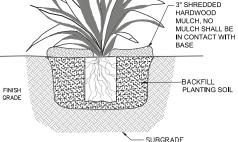
Zone D Plants

COMMOM NAME	SCIENTIFIC NAME	QUANTITY	SPACING	SIZE
Pickerelweed	Pontederia cordata	-		
Arrowhead	Sagittaria latifolia			
Giant bur-reed	Sparganium eurycarpum			
Northern Water Plantain	Alisma triviale			

COMMOM NAME	SCIENTIFIC NAME	QUANTITY	SPACING	SIZE
Ironwood	Carpinus caroliniana		as shown	#5 pot
Tamarack	Larix Iaricina		as shown	#10 pot
Black Spruce	Picea mariana		as shown	#5 pot
Bog Birch	Betula glandulosa		as shown	#2 pot
White Oak	Quercus alba		as shown	#7 pot
Bur Oak	Quercus macrocarpa		as shown	#7 pot

COMMOM NAME	SCIENTIFIC NAME	QUANTITY	SPACING	SIZE
Redtwig Dogwood	Cornus sericea		6' O.C.	#2 pot
Winterberry 'Jim Dandy'	llex verticillata 'Jim Dandy'		5' O.C.	#2 pot
Winterberry 'Red Sprite'	llex verticillata 'Red Sprite'		5' O.C.	#2 pot







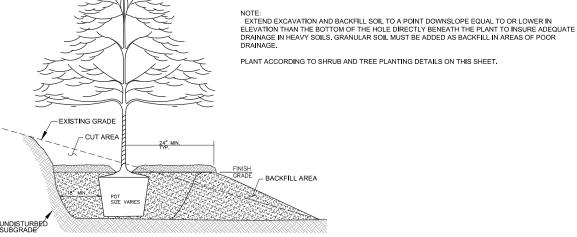
HERBACEOUS PLUG AND POT PLANTING NOTES:

- PROVIDE AND INSTALL PLANTS PER SCHEDULE. EXCAVATE HOLE 3 TIMES WIDTH OF ROOTBALL
- BREAK BOTTOM OF ROOTBALL TO LOOSEN ROOTS.
 PLANT THROUGH MULCH ALIGNING ROOTBALL TOP EVEN WITH SOIL DO NOT PLANT TOO DEEP OR TOO SHALLOW, FIRM SOIL TO ENSURE GOOD CONTACT WITH ROOTS.
- BACK FILL WITH PLANTING SOIL FIRM SOIL AROUND ROOT MASS TO MAINTAIN PLUMB AND ENSURE NO AIR GAPS AROUND ROOT MASS.
- APPLY 3" DEPTH SHREDDED HARDWOOD MULCH TO ENTIRE PLANTING AREA (SOIL PREPARED AS PER SPECIFICATIONS)
- NO MULCH TO BE IN CONTACT WITH PLANT.

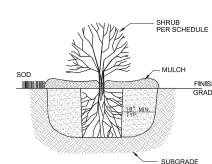
 CONSTRUCT 3" WATERING BASIN. THOROUGHLY WATER WITHIN 3 HOURS OF INSTALLATION.
- WATER THOROUGHLY AFTER PLANTING.
- YALL PERENNIAL PLANTS PROVIDED BY THE CONTRACTOR SHALL BE GUARANTEED FOR ONE YEAR FROM THE DATE OF OWNER ACCEPTANCE. AT THE END OF THE ONE-YEAR GUARANTEE PERIOD ALL PERENNIALS SHALL BE IN SATISFACTORY CONDITION, EXCLUDING INSTANCES OF
- PERIOD ALL PERENNIALS SHALL BE IN SATISFACTION? CONDITION, EXCLUDING INSTANCES OF VANDALISM, AS DETERMINED BY OWNER.

 1. REPLACEMENTS: AT THE END OF THE ONE YEAR WARRANTY PERIOD ALL PLANTS SHALL FUFILL ALL THE REQUIREMENTS OF THESE SPECIFICATIONS AND REFERENCES WITH REGARD TO QUALITY AND CONDITION; FURTHER, THEY SHALL BE FREE OF DEAD BRANCHES AND TWIGS AND SHALL BEAR A MINIMUM OF 56% OF THE FOLIAGE PRESENT WHEN PLANTED HAVING NORMAL DENSITY, SIZE, SHAPE AND COLOR AS DETERMINED BY THE ENGINEER. ANY PLANTS FAILING TO DENSITY, SIZE, SHAPE AND COLOR AS DETERMINED BY THE ENGINEER. ANY PLANTS FAILING TO SATISFY ALL THESE CONDITIONS SHALL BE REPLACED AS PER THE PRELIMINARY AND FINAL ACCEPTANCE PROCESS. PLANTS MAY BE REPLACED PRIOR TO THE END OF THEIR WARRANTY PERIOD IF SUCH AN AGREEMENT EXISTS BETWEEN THE CONTRACTOR AND THE OWNER. REPLACEMENT STOCK SHALL BE SUBJECT TO ALL REQUIREMENTS AS TO SELECTION, INSPECTIONS, PREPARATION, PLANTING AND MAINTENANCE OPERATIONS, REPLACEMENTS SHALL MACTH CALIPER ANDIOR HEIGHT ATTAINED BY OTHER STOCK OF THE ORIGINAL PLANTING.

 11. CONTRACTOR SHALL NOTIFY OWNER FOR A FINAL INSPECTION AFTER THE END OF THE
- GUARANTEE PERIOD, AND AGAIN AFTER ANY AND ALL REPLACEMENTS ARE PLANTED.







DETAIL: SHRUB PLANTING

SCARIFY BOTTOM AND SIDES OF HOLE PRIOR TO PLANTING.

REMOVE DEAD OR DAMAGED BRANCHES. RETAIN THE NATURAL FORM OF THE SHRUB.

HAND LOOSEN ROOTS OF CONTAINERIZED MATERIAL. IF NECESSARY, SCORE OUTSIDE OF SOIL MASS TO REDIRECT CIRCLING FIBROUS ROOTS.

SET SHRUB ON UNDISTURBED NATIVE SOIL OR ON THROUGHLY COMPACTED BACKFILL SOIL, AT THE SAME DEPTH AS IT WAS GROWN IN THE NURSERY.

BACK FILL WITH PLANTING SOIL - SEE SPEC. DISH TOP OF BACKFILL BY 3" TO ACT AS WATERING BASIN

PLACE 4" DEPTH SHREDDED HARDWOOD

DIG PLANT HOLES 18" MIN. LARGER THAN CONTAINER SIZE, ALL SIDES.

REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION, IN CASE OF ANY DISCREPANCIES BETWEEN THIS DETAIL, PLANS OR SPECIFICATIONS, THE SPECIFICATION SHALL GOVERN.



- POTHOLE ALL EXISTING UTILITIES WITHIN THE PROJECT LIMITS BEFORE EARTHWORK BEGINS.
- INFORM THE LANDSCAPE ARCHITECT OF PLANTING TWO DAYS PRIOR TO PLANT DELIVERY.
- 3. CONTRACTOR SHALL COORDINATE LAYOUT OF ALL PLANTS WITH DIRECTION OF LANDSCAPE ARCHITECT IN THE FIELD.
- PLACE SHREDDED HARDWOOD MULCH (MN/DOT SPEC 3882.2 TYPE 6 WEED SEED FREE SHREDDED HARDWOOD.) TO A DEPTH OF 3" WITHIN ALL PLANTING AREAS ONCE PLANT INSTALLATION IS COMPLETE.
- 5. INSTALL THE STEEL LANDSCAPE EDGING PER MANUFACTURER RECOMMENDATION INCLUDING STAKING SPACING AND
- 6. CONTRACTOR WILL BE RESPONSIBLE FOR WATERING PLANTS (REGARDLESS OF NOTIFICATION) DURING ENTIRE WARRANTY PERIOD. WATERING WILL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
- ALL EXISTING CONCRETE, ASPHALT, TREES TO BE KEPT AND TREE ROOTS SHALL BE PROTECTED. ANY DAMAGE TO EXISTING SITE FEATURES SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE AND TO THE OWNER'S
- SATISFACTION. DAMAGE TO EXISTING STRUCTURES OR NEWLY CONSTRUCTED ITEMS SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
- REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. IN THE CASE OF ANY DISCREPANCIES BETWEEN THIS DETAIL, PLANS, OR SPECIFICATIONS, THE SPECIFICATIONS SHALL GOVERN.

PRELIMINARY DRAFT

EREBY CERTIFY THAT THIS PLAN, SPECIFICATION, O AS SHOWN WESTWOOD HILLS NATURE CENTER S PREPARED BY ME OR UNDER MY DIRECT ISION AND THAT I AM A DULY LICENSED ARCHITECT LINDER THE LAWS OF THE STA 23/27-1658.00 BARR ENGINEERING CO. 08/08/2018 CITY OF ST. LOUIS PARK NORTH RAIN WATER FEATURE BARR 4300 MARKETPOINTE DRIVE LIENT PROJECT No. KJN2 MAK MINNEAPOLIS, MN 55435 PLANTING DETAILS VMC 90% REVIEW MEETING B C 0 1 2 3 FJR RELEASE REVISION DESCRIPTION _LICENSE#

WHAT IS A PEAT BOG?

You can find a bog not too far from here at Wirth Park and

Bogs are a special type of wetland found on saturated, acid peat soils. They support a unique collection of trees, low shrubs and herbs, growing on a mat of sphagnum moss. In Minnesota, most bogs are found north of the twin cities.

HOW IS A BOG CREATED?

BOG FORMATION DIAGRAM GOES HERE

Bogs originate on a floating mat of sedges usually at the edge of a lake that becomes colonized by sphagnum mosses. As the mat gradually thickens and becomes more stable, it is populated by evergreen shrubs of the heath family (Ericaceae). Eventually, tamarack and black spruce can be supported by the mat. Peat accumulates when plant material does not fully decay because of cold, acidic and low-oxygen conditions.

In peat bogs the annual rate of biomass production is greater than the rate of decomposition. This makes bogs very efficient at absorbing carbon dioxide.



SPHAGNUM MOSS

Sphagnum mosses are the characteristic species of bogs. They play an important role in keeping the bog environment acidic by their production of organic acids. Sphagnum mosses are commonly known as peat moss. Approximately 20 species of Sphagnum are found in our area.

PITCHER PLANTS

Pitcher plants are extremely well-adapted to this wet, highly acidic environment. Peat bogs are low in nutrients. To compensate, pitcher plants are carnivorous - they "eat" insects that get trapped in the bowl of water they hold (actually, they dissolve them) to get the nutrients they need.

TAMARACK TREES

Tamaracks are hardy, cold-tolerant deciduous conifers. The needles turn golden in autumn and drop annually. Both tamaracks and black spruce trees are found in fully developed peat bogs. (more info to be added)

WOODLAND CARIBOU

Woodland Caribou are a threatened subspecies of reindeer that primarily live in bogs, marshes, lakes and river regions. (more info to be added)

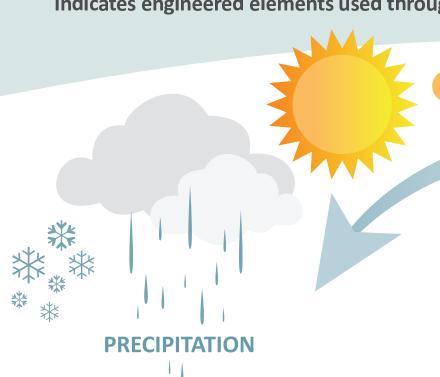




UNDERSTANDING THE HYDROLOGIC CYCLE

This water feature mimics a natural hydrologic cycle. The water drop symbol indicates engineered elements used throughout the system.

The hydrologic cycle is the movement of water from the surface of oceans and lakes into the atmosphere, over land, and back to the earth's surface. During this process, water changes from liquid to solid (ice) to gas and back to liquid.



PUMP OUTFLOW

SOLAR PANEL



SNOW MELT & RAINWATER RUNOFF















PLANT UPTAKE



GROUNDWATER FLOW

