



MILWAUKEE PUBLIC SCHOOLS

RIVER TRAIL SCHOOL URBAN FOREST

JOANNA COLLETTI PE, CFM
MARKET AREA LEADER - WATER
GRAEF



BACKGROUND

MPS
SCHOOL DISTRICT



NORTHSIDE
OF MILWAUKEE



400 K-8
STUDENTS



AG FOCUSED
CURRICULUM THAT FEEDS IN TO
HIGH SCHOOL PROGRAMMING



A MULTI-PHASE INITIATIVE

PHASE

1

The catalyst for the following phases - created raised garden beds with funding from the American Heart Association.

PHASE

2

Compost program (School Lunches)
Pumpkin Patch
Green Houses (Interior & Exterior)
Hydroponics Towers,
Butterfly Garden
4-H Club

PHASE

3 & 4

Create the design for and start construction of an urban forest that also captures and retains 100% of stormwater onsite.



THE SITE

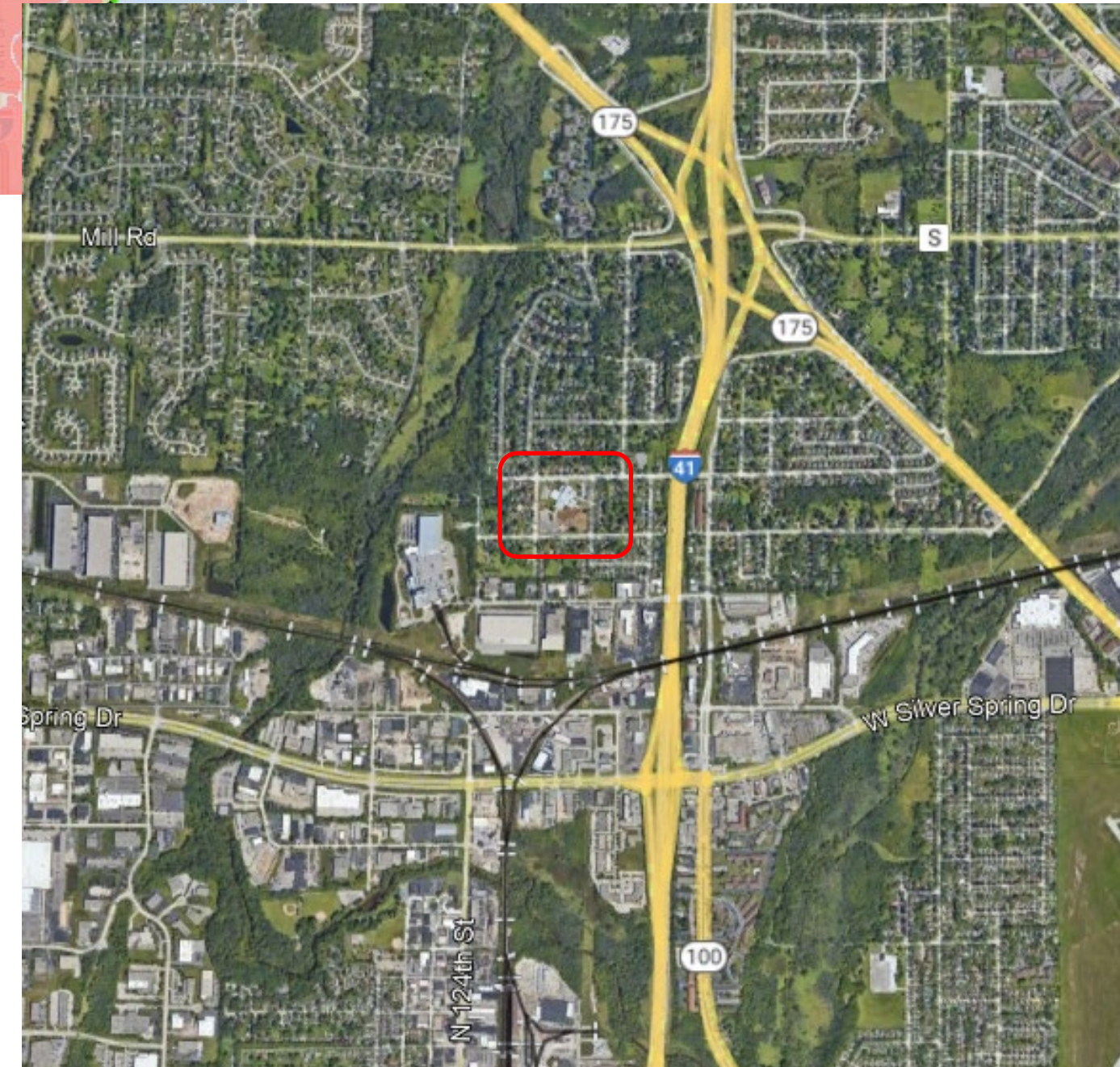
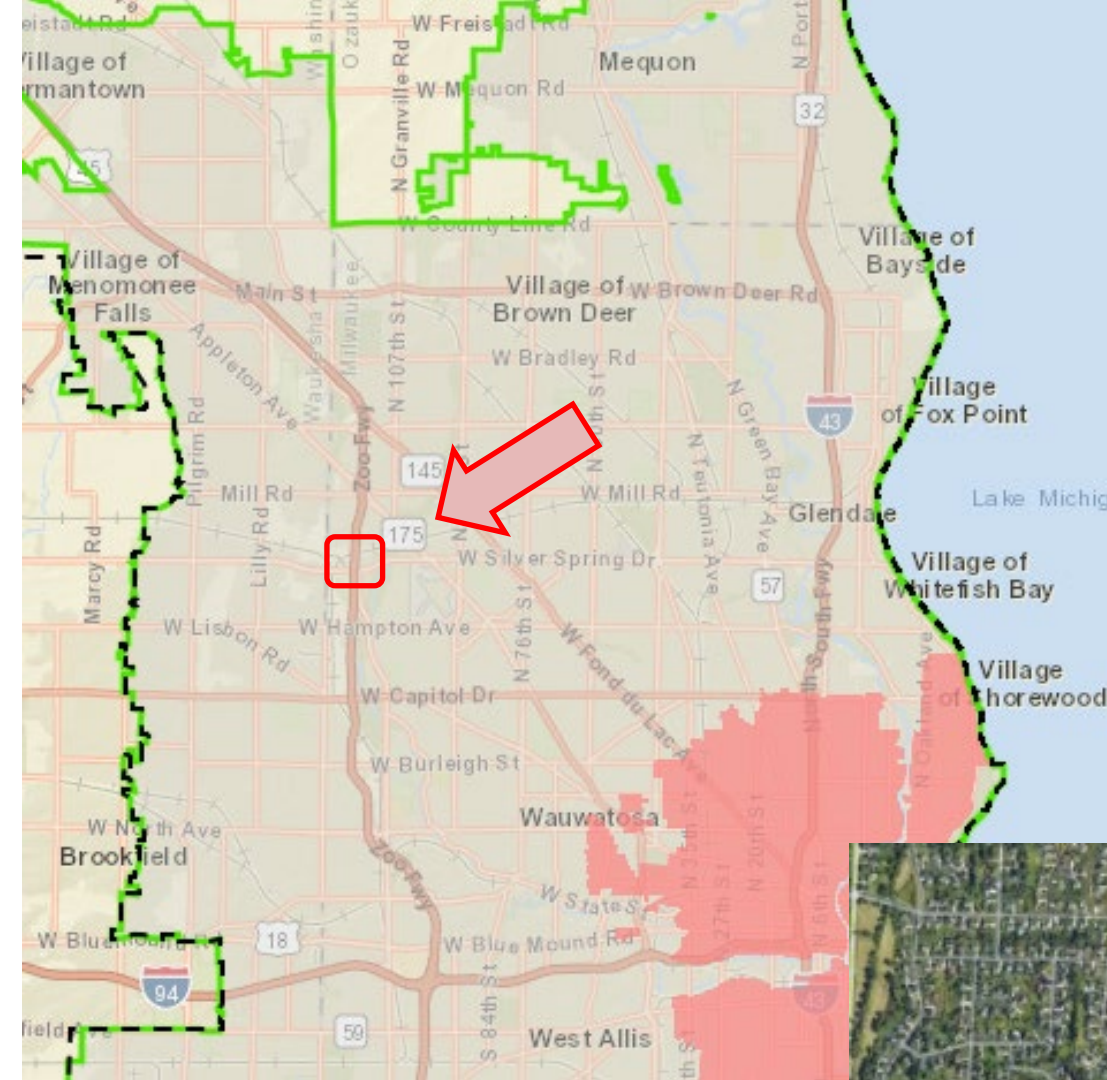
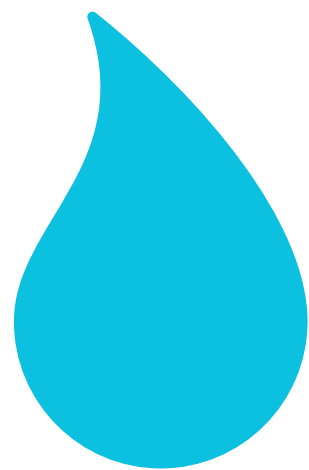


Within MMSD Service Area Boundary & northwest of downtown Milwaukee.

Urbanized area of city.

East of Menomonee River & west of US 41.

Sheet drains from school (northwest) to intersection of W Bobolink Avenue and N 119th Street (southeast).



THE SITE



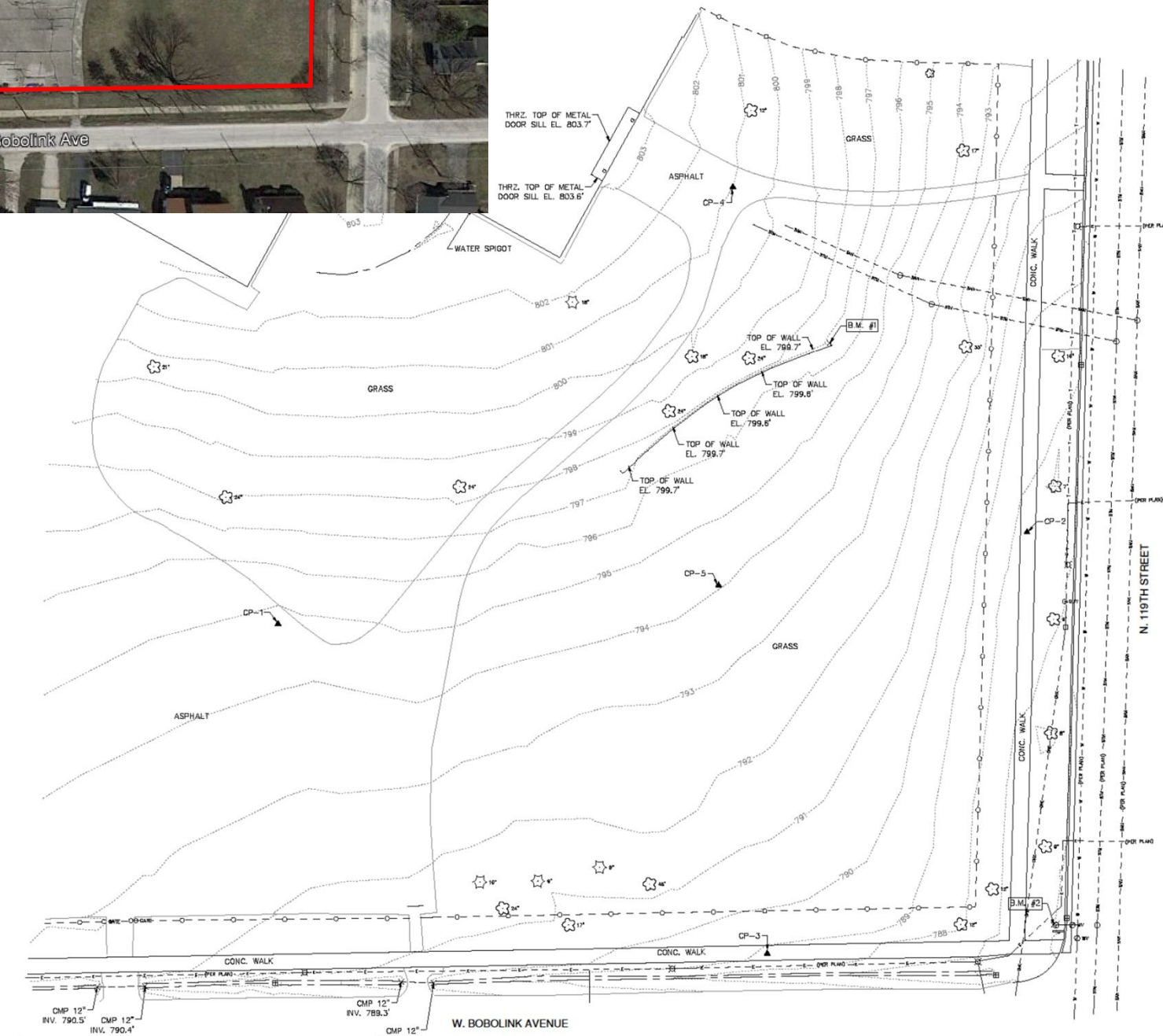
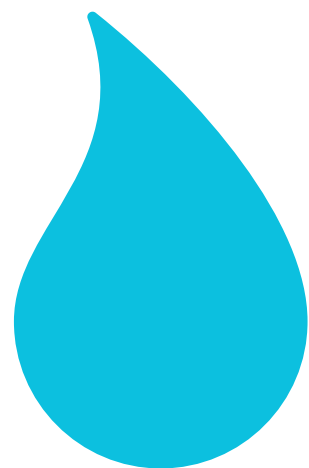
Approximately 2 acres of underutilized open space, mostly turf grass & 21% impervious.

Slopes about 14 feet over a length of 290 feet, from northwest to southeast.

Roadside ditches for conveyance of rainwater adjacent roads.

No utilities in project area.

Neighborhood experiences nuisance flooding at intersection southeast of school grounds.



PHASE 4 PARTNERS

Project Designer



Landscape Architecture, Civil Engineering, Stormwater Engineering, Environmental Engineering, Surveying

Project Owners



MILWAUKEE
PUBLIC SCHOOLS



Project Funding



GREENFIRE

Construction Management



Contractor

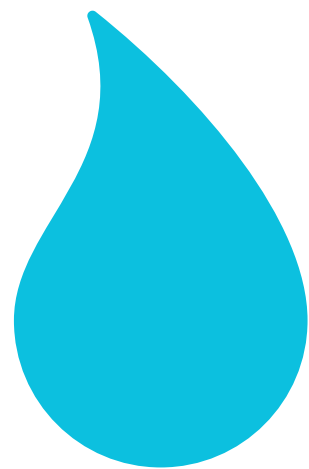
THE DESIGN

Series of ridges and troughs, aligned along the contours of a sloping site.

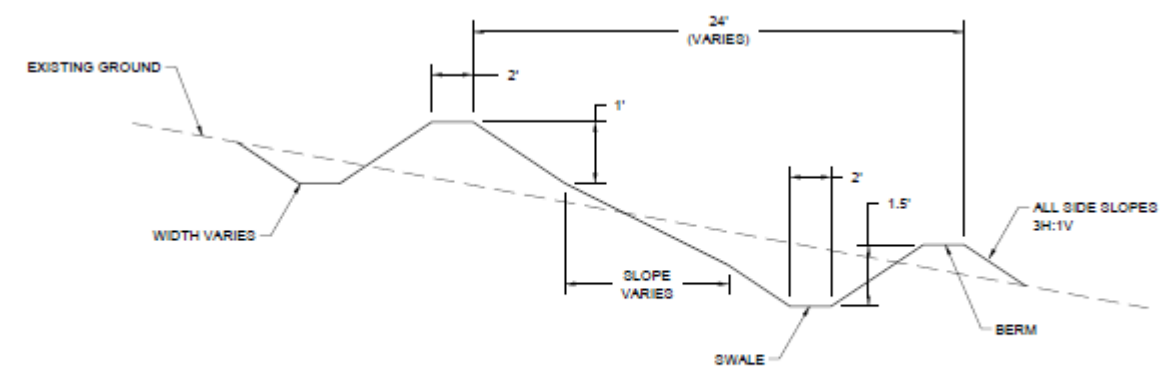
Similar overall slope as before – tied into existing fence line.

The design included the installation of nine shallow drainage swales cut parallel to the existing contours of the site approximately 30' apart from one another.

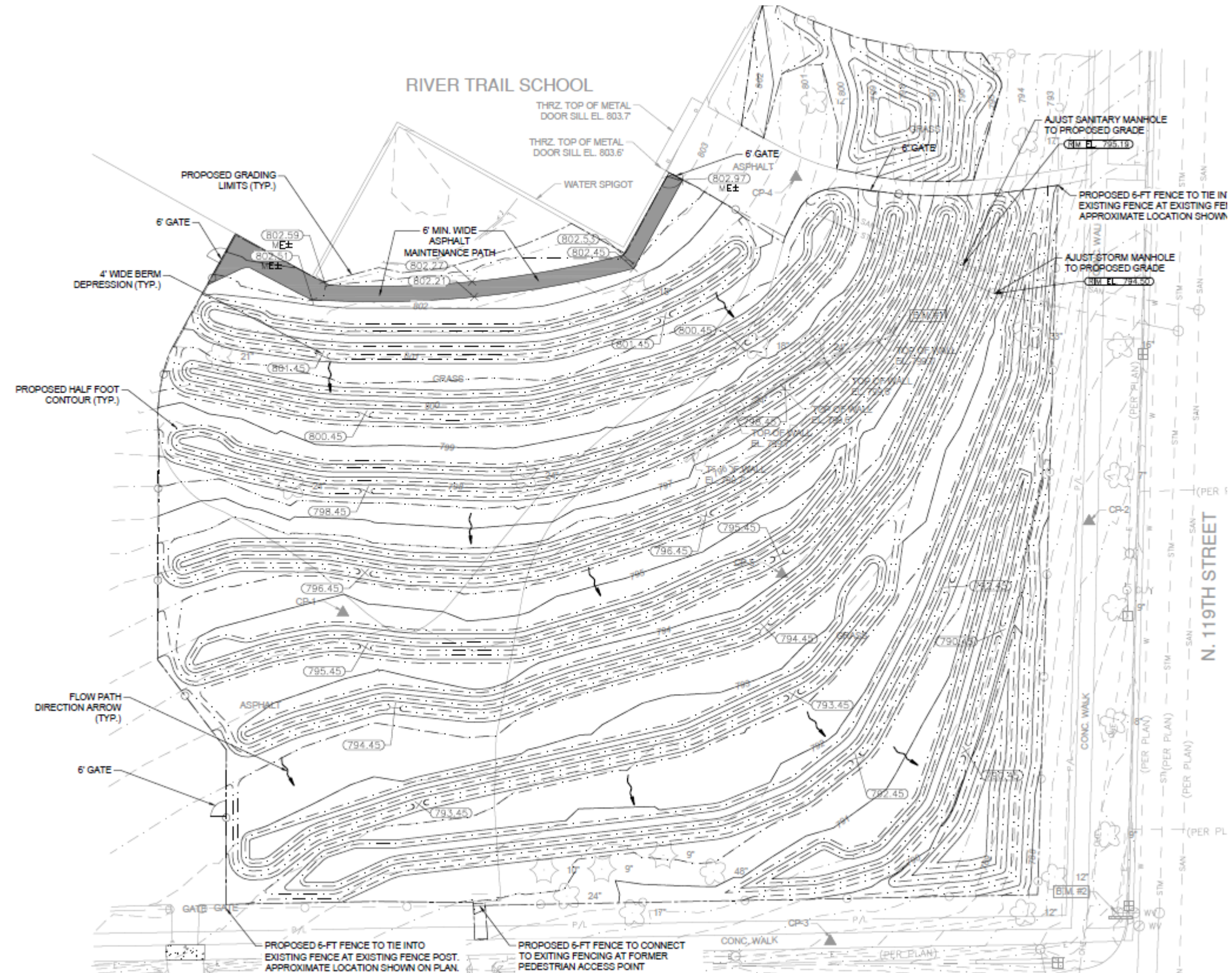
HydroCAD used to model existing and proposed runoff characteristics and provide design guidance for proposed condition.



THE DESIGN

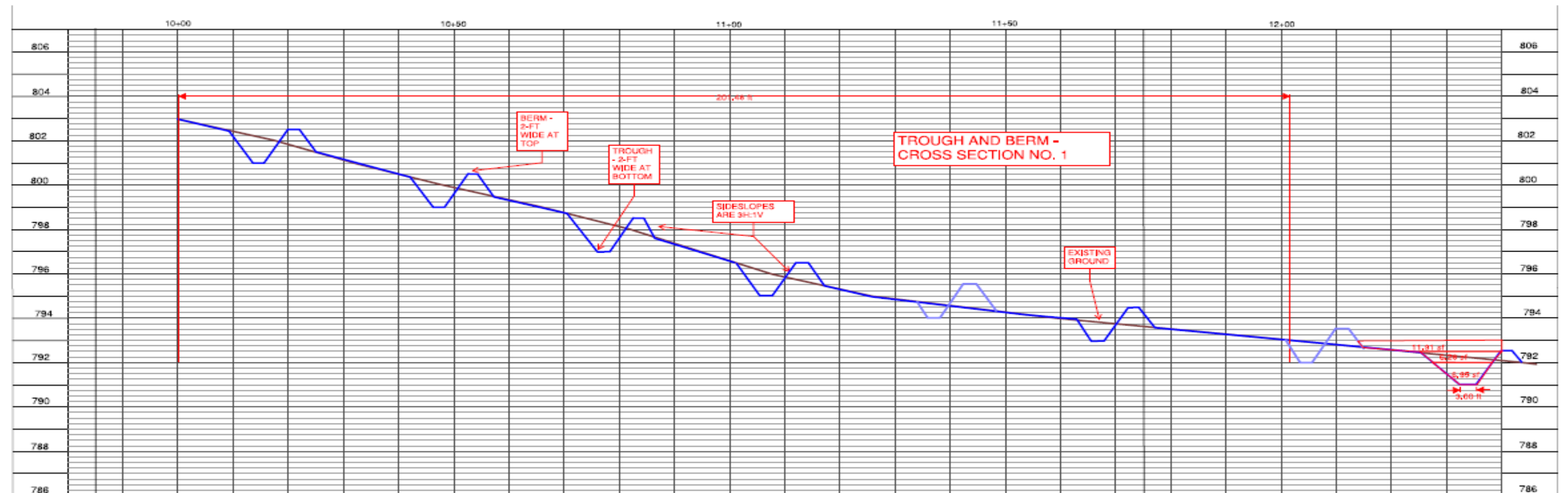


01 SWALE AND BERM - TYPICAL SECTION



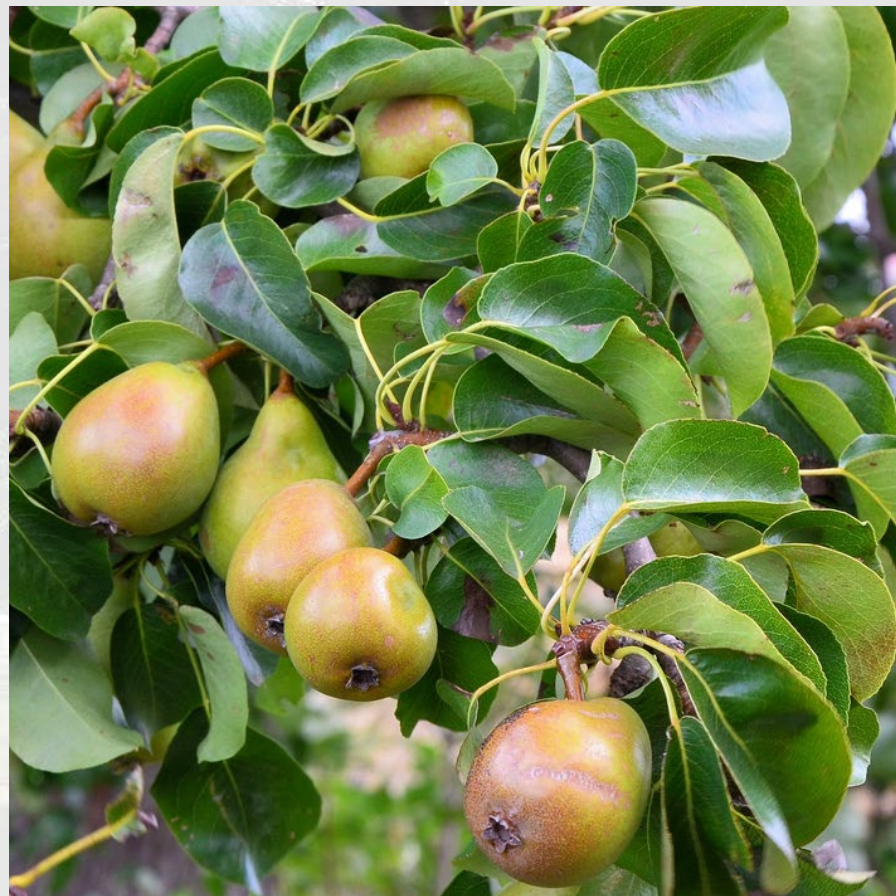
PROPOSED 6-FT FENCE TO TIE INTO EXISTING FENCE AT EXISTING FENCE POST. APPROXIMATE LOCATION SHOWN ON PLAN.
 PROPOSED 6-FT FENCE TO CONNECT TO EXISTING FENCING AT FORMER PEDESTRIAN ACCESS POINT

THE DESIGN



IN THE FOREST

Asian Pear Trees (37)



Hazelnut Trees (57)



Chestnut Trees (37)

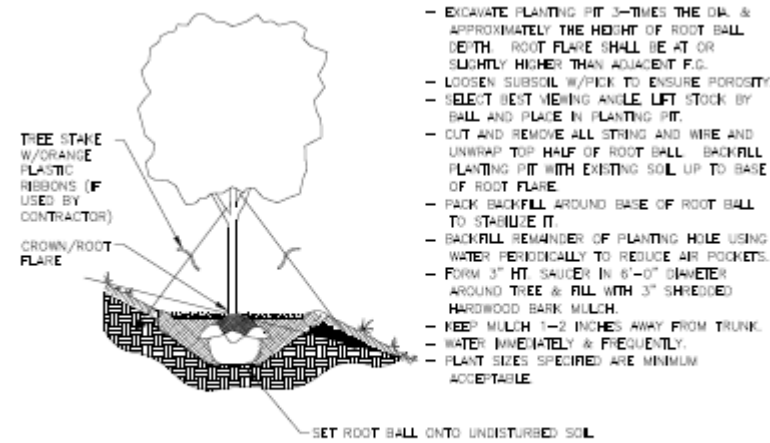


Over 130 trees were planted on site and strategically selected to yield annual output, withstand Wisconsin weather, and have multiple uses.

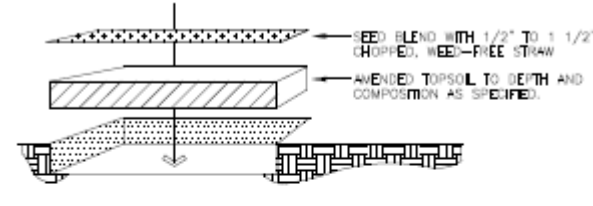


Once these trees are established and start producing successfully, the next phase of the project would include adding plantings of raspberries, blackberries, and currants.

IN THE FOREST



1 TREE PLANTING ON SLOPE DETAIL

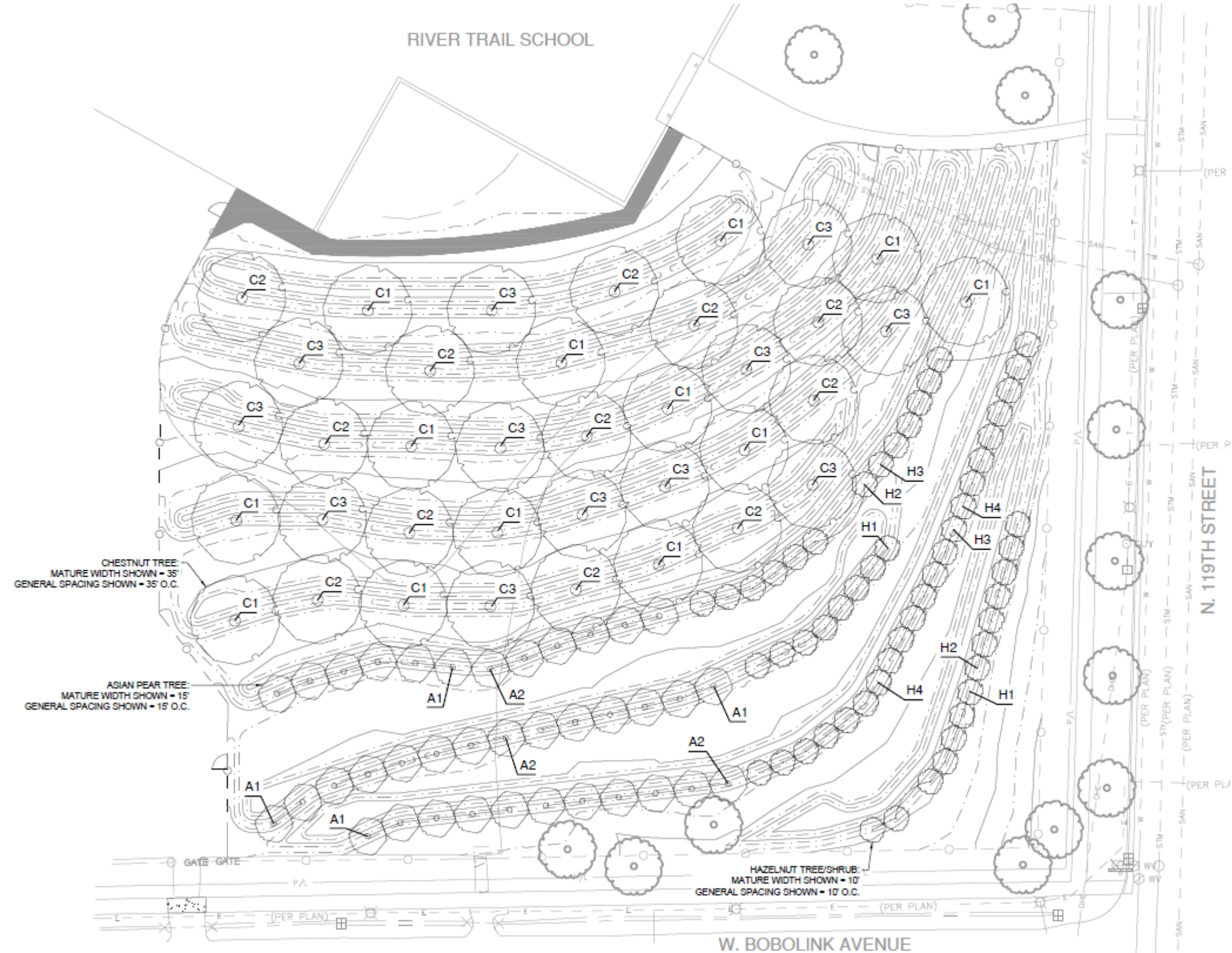


-TOPSOIL SHALL CONFORM TO PROPERTIES AS SPECIFIED.
 -CONTRACTOR TO PROVIDE FINISHED TURF GRADE PER DRAWINGS WITH UNIFORM, NATURAL SLOPES PRIOR TO THE SOWING OF SEED. (SEED BLEND & APPLICATION PROCEDURES ARE DESCRIBED IN WRITTEN SPECIFICATION)
 -LANDSCAPE CONTRACTOR SHALL ESTABLISH VIGOROUS GROWTH AND MAINTAIN AS SPECIFIED.

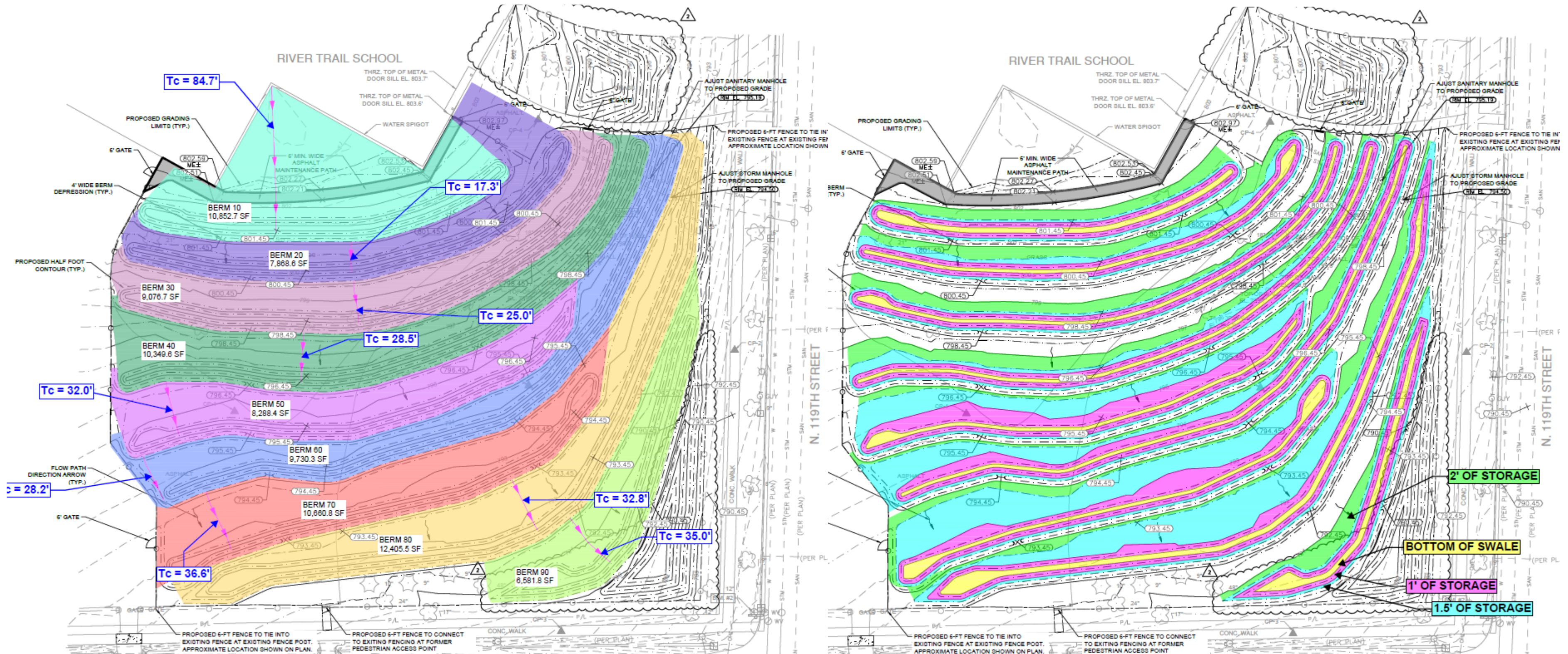
3 MANICURED TURF SEEDING

BOTANICAL NAME	CULTIVAR NAME (COMMON NAME)	SIZE / CONTAINER	SPACING
CHESTNUT TREES			
<i>Castanea crenata</i>	Silverleaf Chestnut (Eurobella)	min. 5' ht. / 2 gal.	as shown
<i>Castanea sativa x crenata</i>	Bisalta No. 3 Chestnut	min. 5' ht. / 2 gal.	as shown
<i>Castanea sativa x crenata</i>	Bouche de Betizac Chestnut	min. 5' ht. / 2 gal.	as shown
<i>Castanea sativa x crenata</i>	Maraval Chestnut	min. 5' ht. / 2 gal.	as shown
<i>Castanea sativa x crenata</i>	Marrisard Chestnut	min. 5' ht. / 2 gal.	as shown
<i>Castanea crenata x mollissima</i>	Schlarbaum Chestnut	min. 5' ht. / 2 gal.	as shown
<i>Castanea crenata x mollissima</i>	Connecticut Early Chestnut	min. 5' ht. / 2 gal.	as shown
*Select 3 cultivars from the list above. Each cultivar should total roughly 1/3 of the 37 total chestnut trees.			
ASIAN PEAR TREES			
<i>Pyrus pyrifolia</i>	Nijiseiki Asian Pear (Twentieth Century)	min. 5' ht. / 2 gal.	as shown
<i>Pyrus pyrifolia</i>	Korean Giant Asian Pear (Don Bae)	min. 5' ht. / 2 gal.	as shown
<i>Pyrus pyrifolia</i>	Hosui Asian Pear	min. 5' ht. / 2 gal.	as shown
<i>Pyrus pyrifolia</i>	Shinseiki Asian Pear	min. 5' ht. / 2 gal.	as shown
*Select 2 cultivars from the list above. Each cultivar should total roughly 1/2 of the 37 total asian pear trees.			
HAZELNUT TREES/SHRUBS			
<i>Corylus avellana 'Yamhill'</i>	Yamhill Hazelnut	min. 4' ht. / 1 gal.	as shown
<i>Corylus avellana 'Dorris'</i>	Dorris Hazelnut	min. 4' ht. / 1 gal.	as shown
<i>Corylus avellana 'Felix'</i>	Felix Hazelnut	min. 4' ht. / 1 gal.	as shown
<i>Corylus avellana 'Theta'</i>	Theta Hazelnut	min. 4' ht. / 1 gal.	as shown
<i>Corylus avellana 'Polly O'</i>	Polly O Hazelnut	min. 4' ht. / 1 gal.	as shown
<i>Corylus avellana 'Jefferson'</i>	Jefferson Hazelnut	min. 4' ht. / 1 gal.	as shown
<i>Corylus avellana 'York'</i>	York Hazelnut	min. 4' ht. / 1 gal.	as shown

*Select 4 cultivars from the list above. Each cultivar should total roughly 1/4 of the 57 total hazelnut trees/shrubs.



THE CALCULATIONS



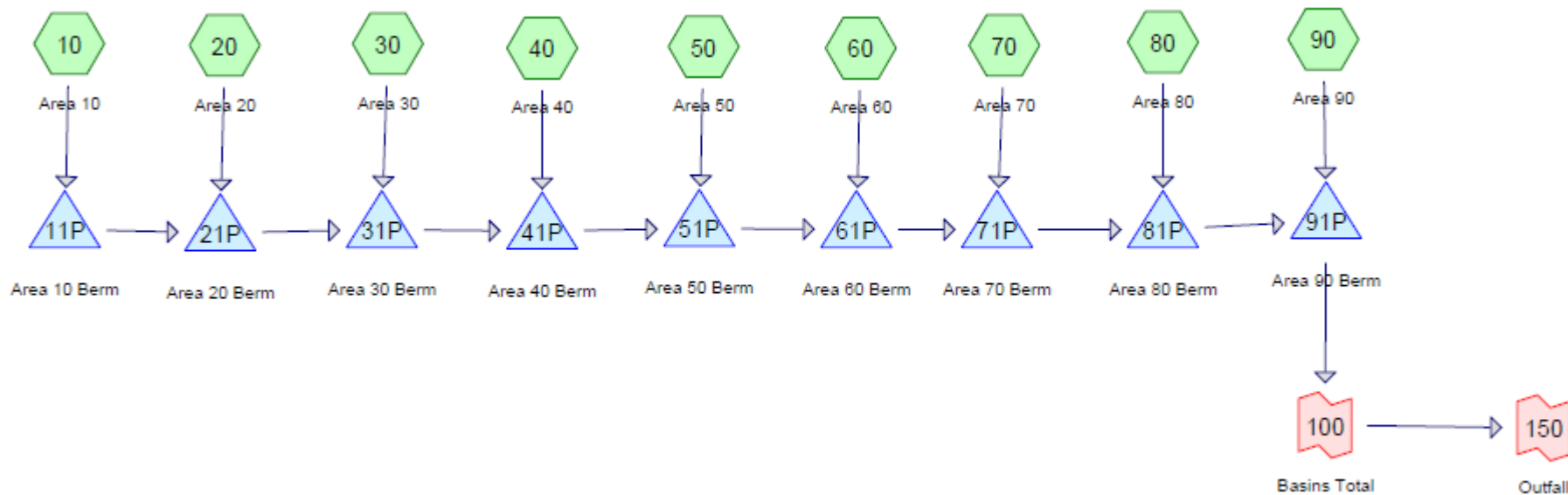
THE CALCULATIONS

Existing Runoff = 181,812 gallons

Proposed Capture Runoff = 176,273 gallons
 160,887 gallons storage
 15,386 gallons infiltration/ evapotranspiration

Storage volume of all berms = 262,854 gallons

Proposed HydroCAD Schematic



Runoff Capture Volume During Critical Duration - 100-year Event, Existing Conditions: 181,812 Gallons

Existing and Proposed Conditions Runoff Volumes				
Rainfall Event (Yr)	Runoff Discharge Volume - Existing Conditions (Gal) ¹	Runoff Volume to BMP (Proposed) (Gal) ²	Runoff Discharge Volume - Proposed Conditions (Gal) ³	Net Runoff Volume Captured (Gal)
2	47,897	38,448	-	47,897
10	87,974	77,221	-	87,974
100	181,812	176,237	-	181,812

- Notes:
- 1 Runoff volume during the critical duration - hydrograph hours 11.75 to 21.25
 - 2 Total volume of runoff to BMPs
 - 3 Total volume of runoff discharged from BMPs

Runoff Volume During Critical Duration - 100-year Event, Existing Conditions: 181,812 Gallons

System Performance - Proposed Conditions									
Subarea	Trough Invert El - ft	Berm Top EL - ft	Overflow Weir EL - ft	Max Water El - 2 yr - ft	Max Water El - 10 yr - ft	Max Water El - 100 yr - ft	Discharge - 2 yr - cfs	Discharge - 10 yr - cfs	Discharge - 100 yr - cfs
10	800	801.50	801.45	800.46	800.96	801.47	0	0	0.04
20	799	800.50	800.45	799.25	799.53	800.32	0	0	0
30	797	798.50	798.45	797.22	797.53	798.18	0	0	0
40	795	796.50	796.45	795.37	795.68	796.23	0	0	0
50	794	795.50	795.45	794.15	794.36	794.95	0	0	0
60	793	794.50	794.45	793.16	793.38	793.99	0	0	0
70	792	793.50	793.45	792.33	792.62	793.12	0	0	0
80	791	792.50	792.45	791.27	791.55	792.05	0	0	0
90	789	790.50	790.45	789.31	789.6	790.15	0	0	0
150 (Outfall)							0	0	0

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	MSE 24-hr	3	Default	24.00	1	2.64	2
2	10-yr	MSE 24-hr	3	Default	24.00	1	3.73	2
3	100-yr	MSE 24-hr	3	Default	24.00	1	6.06	2



BREAKING GROUND





“

This project shows students how problems become solutions. They will see firsthand how stormwater management can not only reduce runoff but support our forest in producing food such as fruit and nuts.

Principal Robin Swan”





2022

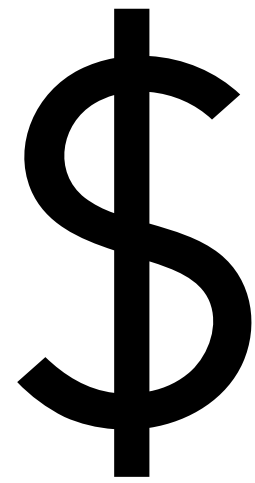


2023



2022 & 2023

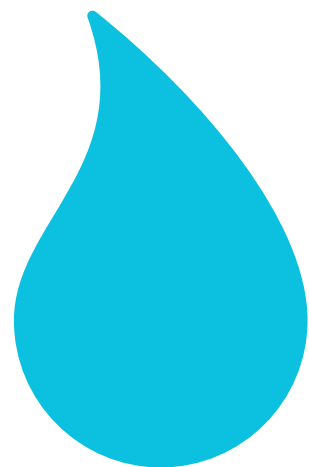
TAKEAWAYS



\$216,000 construction cost as a fully-reimbursable grant through MMSD's Fresh Coast Protection Partnership.

Approximately \$93,000 GRAEF fees from concept drawings to construction administration.

Operation & maintenance to be completed by school & students.



100% of the rainfall in 100-yr 24-hr rain event is captured and infiltrated for use by the planted vegetation.

The forest is expected to retain up to 178,000 gallons (~0.5 ac-ft) of rainwater in 100-yr 24-hr condition.



PHASE 5



Phase 5 of the program will have the students running and maintaining the numerous agriculture projects as well as the business of selling the produce as a part of their regular educational experience. Students will harvest the resulting products for local sale at farmer's markets to learn business concepts and support the program.



The school also has a goal to bring in sheep and chickens to graze fallen fruit and fertilize the soil, with a turkey or goose to protect them. In the areas where rainwater pools, there could be frogs, toads, and salamanders.



It is estimated that River Trail Schools will be able to raise nearly \$20,000 a year with the produce that they take to market. The funds will be put directly back into the program.



THANK YOU!

Q + A

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