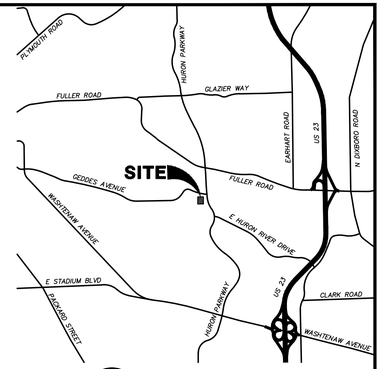
RACQUET CLUB OF ANN ARBOR
PUMP HOUSE & SITE RENOVATION
3010 HICKORY LANE, CITY OF ANN ARBOR, WASHTENAW COUNTY, MICHIGAN 48104
SITE PLAN ADMINISTRATIVE AMENDMENT
CITY SUBMITTAL 2 - JULY 9, 2021



VICINITY MAP
SCALE : NTS
SECTION 26, T2S, R6E

OWNER
RACQUET CLUB OF ANN ARBOR
3010 HICKORY LANE
ANN ARBOR, MI 48108
ATTN: BRENT SCHOMAKER
734-216-0579

ARCHITECT
MITCHELL AND MOUAT ARCHITECTS
113 SOUTH FOURTH AVE.
ANN ARBOR, MI 48104
ATTN: JOHN MOUAT
734-662-6070

ENGINEER/SURVEYOR
MIDWESTERN CONSULTING, LLC
3815 PLAZA DR.
ANN ARBOR, MI 48108
CONTACT: JEREMY MATTHEI, PE
734-995-0200

ANN ARBOR RACQUET CLUB
Narrative Description

I. DEVELOPMENT PROGRAM SUMMARY

The Racquet Club of Ann Arbor is a tennis and swim club that began in the mid 1960's and is located at 3010 Hickory lane at the southwest corner of Geddes and Huron Parkway. Facilities at the club include clay and all weather tennis courts, a full size pool, tennis locker rooms, office and pro shop, children's pool, playground amenities and grilling and food vending. The facility is open seasonally during daylight hours only. A previous Administrative Amendment in 2015 provided for the reconstruction of the tennis building and outdoor grill.

This proposal contained within this submittal includes the demolition of the existing pump building and replacing it with a new 935 SF pump building. This work will remove the existing pool outlet's sanitary sewer connection, treat the water in the pump building, and direct it to the stormwater infiltration tanks. Also included is the replacement of parts of the pool deck, retaining wall replacement, the addition of a paved rear access to the pump house and pool deck and the addition of an open-air spa tub, and miscellaneous utility installation.

A. Proposed Land Use

The Racquet Club of Ann Arbor will continue to operate as a private tennis, swim and recreational facility.

B. Phasing and Construction Cost

(B.1) Preliminary Phasing: All construction shall be completed in one phase beginning in the fall of 2021 and being completed in the spring of 2022.

(B.2) Preliminary Cost Estimate: The combined estimated total project construction cost, including utilities, structures, landscaping and site amenities is approximately $1.0 million.

1. Community Analysis

(a) Impact on Schools

The project will have no impact on the school system.

(b) Relationship with Neighboring Uses

The proposal is consistent with the existing use at this site and should present no objection to neighboring uses.

North of Site: The north side of the site is Geddes Road leading down to the Huron River.
West of Site: Hickory Lane lies west of the site and serves adjacent residential properties that were developed after the club was established.
South of Site: Contains the Huron Hills Golf course.
East of Site: Contains a public ROW for what once was the entrance from Geddes Road onto south bound Huron Parkway. It is now a bike lane.

(c) Impact on Adjacent Uses

The proposed development will have no negative impact on existing uses around the site and is consistent with the current use.

(d) Impact of Development Relevant to Various Issues:

- Air Quality: The proposal will have no impact on air quality.
- Water Quality: The reconstructed parts of this site will be provided with storm water management facilities in accordance with current standards and discharged in accordance with City of Ann Arbor and Washtenaw County Water Resources Commissioner standards. Stormwater will be collected into proposed trench drains that will be tied-in and directed into an existing system constructed in 2016 with spare capacity.
- Natural Features: Sheet 1 of the site plan provide a graphic description of the natural features that are found on the site. Natural features on this site consist solely of landmark trees. The area that is proposed for development is almost entirely existing improvements in the form of buildings and pedestrian improvements. The development program concentrates all of the activities in this area thus eliminating any impact to landmark trees.
- Wetlands: The site contains no wetlands.
- Steep Slopes: the site contains no steep slopes.
- Floodplains: There are no 100 year floodplains or watercourses that will be impacted by the development.
- Endangered Species or Habitat: None known to exist.
- Woodlands: There are no qualifying woodlands on site.
- Solid Waste – Solid waste removal will be contracted privately using the existing facilities.
- There are no historical sites, structures or districts impacted by the proposed development.

2. Site Analysis

(a) Existing Land Use

The existing land zoning is Agricultural while the use of the parcel is recreational. The land has been utilized in this fashion for decades.

(b) Site Conditions

The site is shown in the USDA Soil Conservation Service Soil Survey of Washtenaw County to be primarily Boyer series with 0 to 6% slopes. Site vegetation includes almost exclusively planted trees and shrubs and several native landmark trees that will not be affected. Topography ranges from 785 USGS down to 769 USGS. Sheet 1 of the Area Plan graphically depicts the site conditions.

(c) Natural Features Description

(i) No endangered species are known to exist on-site.
(ii) There is no 100-year floodplain on-site.
(iii) The landmark trees on site are shown on Sheet 1.
(iv) There are no steep slopes on the site.
(v) There are no permanent watercourses on-site.
(vi) There are no wetlands on the site.
(vii) There are no woodlands on the site.

(d) Existing Structures

The site contains a managers residence with a detached garage, a pool building a tennis building, a snack shack grill and two barns for storage.

(e) Access Points

Vehicular: The site has access through two entrances off of Hickory Lane and one off Geddes Road. No other connections to adjacent properties are anticipated.

Pedestrian and Bicycle: There are currently no sidewalks along Geddes Ave. in front of this location and none are proposed due to expected cost and landscape impacts to the screening trees and power poles, however there is a crosswalk leading to a sidewalk on the far side of Geddes Ave, and Geddes Ave. has bike lanes on both sides of the road. In 2016 a sidewalk was added along the east side of Hickory Lane extending from the Geddes Road crosswalk to the northern edge of the southerly drive approach. Sidewalk waivers for the remainder of Hickory Lane and for the South side of Geddes Ave. were obtained for projects in 1997, 2008, and 2015, and we are requesting a renewal of the waiver with this project.

(f) Utilities

Water: Water is received from a public main located in Geddes Road.
Sanitary Sewer: it is unknown where sanitary sewer service is received from.

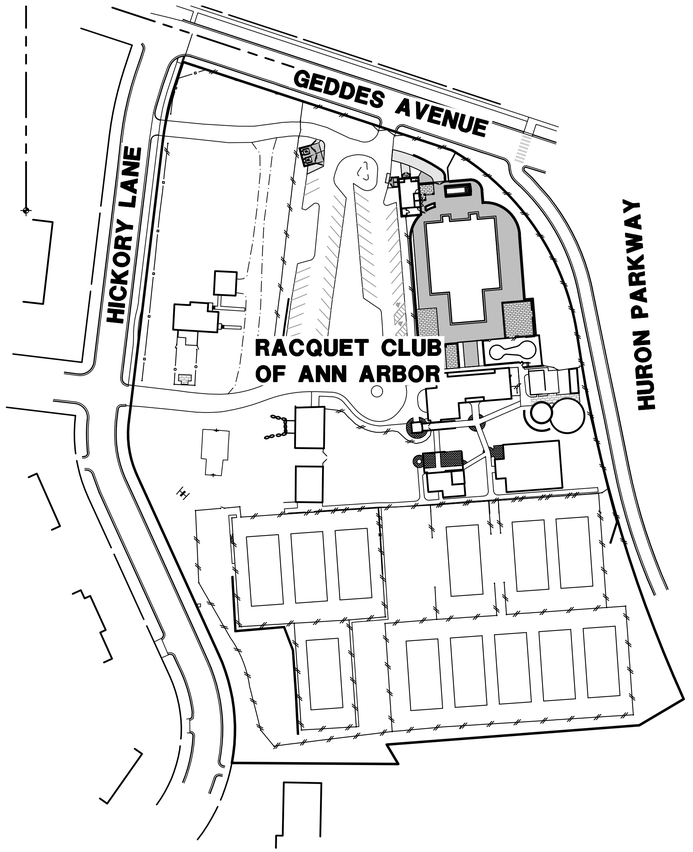
Storm Sewer: Storm sewer will collect and drain stormwater runoff to a new underground storm water detention and infiltration unit on the site.

(g) Drainage

All on-site drainage that is equitable to the new improvements will be detained on-site until it is discharged in accordance with City of Ann Arbor and Washtenaw County Water Resources Commissioner standards. The stormwater discharges to a centeral storm sewer which will divert the flow into an underground detention and infiltration chamber. The proposed drainage system will be completely internal to the site and utilize sheet flow, underground storm sewer and swirl separators that filter the stormwater and release the runoff at a pre-developed rate of discharge.

3. Traffic Impact

The scope of this project includes the reconstruction of existing facilities only. No new uses or expansion of existing uses is proposed therefore no new trip generation is expected.



SITE MAP
SCALE : 1"=80'

Sheet List Table

SHEET NUMBER	SHEET TITLE
C1.0	COVER SHEET
C1.1	ALTA TOPOGRAPHIC SURVEY
C1.2	DEMOLITION PLAN
C2.0	OVERALL SITE PLAN
C2.1	FIRE SAFETY PLAN & TRASH TRUCK MOVEMENTS
C2.2	LAYOUT & MATERIALS PLAN – NORTH
C2.3	LAYOUT & MATERIALS PLAN – SOUTH
C2.4	GRADING PLAN – NORTH
C2.5	GRADING PLAN – SOUTH
C2.6	PAVING AND SITE DETAILS
C2.7	DUMPSTER ENCLOSURE AND BOLLARD DETAILS
C2.8	RETAINING WALL DETAILS
C3.0	UTILITY PLAN
C3.1	STORM & SANITARY PLAN & PROFILES
C3.2	WATER LEAD PLAN & PROFILE
C3.3	UTILITY DETAILS
C3.4	TRENCH DRAIN DETAILS
C4.0	STORMWATER PLAN
C4.1	STORM CALCULATIONS
C4.2	2016 PROJECT – STORMWATER PLAN
C4.3	2016 PROJECT – STORMWATER CALCS
C5.0	SOIL EROSION CONTROL PLAN
C5.1	SOIL EROSION CONTROL NOTES AND DETAILS
L1.0	OVERALL LANDSCAPE PLAN
L2.0	LANDSCAPE NOTES AND DETAILS

GENERAL NOTES:

PER CHAPTER 49, SECTION 4:58 OF THE CITY CODE, "ALL SIDEWALKS SHALL BE KEPT AND MAINTAINED IN GOOD REPAIR BY THE OWNER OF THE LAND ADJACENT TO AND ABUTTING THE SAME. PRIOR TO THE ISSUANCE OF THE FINAL CERTIFICATE OF OCCUPANCY FOR THIS SITE, ALL EXISTING SIDEWALKS IN NEED OF REPAIR MUST BE REPAIRED IN ACCORDANCE WITH CITY STANDARDS."

THE CONSTRUCTION COVERED BY THESE PLANS SHALL CONFORM TO THE CITY OF ANN ARBOR PUBLIC SERVICES DEPARTMENT STANDARD SPECIFICATIONS.

THE CONSTRUCTION COVERED BY THESE PLANS SHALL CONFORM TO THE CITY OF ANN ARBOR PUBLIC SERVICES DEPARTMENT STANDARD DETAILS.

THE OMISSION OF ANY STANDARD DETAILS DOES NOT RELIEVE THE CONTRACTORS OF THEIR OBLIGATION TO CONSTRUCT ITEMS IN COMPLETE ACCORDANCE WITH PUBLIC SERVICES DEPARTMENT STANDARD SPECIFICATIONS.

LINE STOPS SHALL BE INSTALLED WHERE EXISTING WATER MAINS CANNOT BE SUFFICIENTLY ISOLATED TO COMPLETE THE WORK. THE COST OF ANY LINE STOP INSTALLATION IS THE RESPONSIBILITY OF THE DEVELOPER AND/OR CONTRACTOR.

PAVEMENT MARKINGS DISTURBED AS A RESULT OF PAVEMENT CUTS OR CONSTRUCTION ACTIVITIES SHALL BE REPLACED AS DIRECTED BY PROJECT MANAGEMENT. REPLACEMENT DURING CONSTRUCTION OF THE PROJECT MAY BE CONSIDERED TEMPORARY, WITH FINAL PAVEMENT MARKING RESTORATION TO OCCUR AT THE END OF THE PROJECT.

THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE EXISTING ROAD PAVEMENT. DAMAGE TO THE PUBLIC ROAD PAVEMENT DURING THE COURSE OF CONSTRUCTION MAY NECESSITATE MILLING AND RESURFACING OF THE DAMAGED AREAS PRIOR TO ISSUANCE OF THE CERTIFICATE OF OCCUPANCY.

RACQUET CLUB OF ANN ARBOR

JOB No. **20213**
DATE: 7/8/2021
SHEET 1 OF 25
CADD:
ENG: JAM
PM: SWB
TECH:
/20213CV1

ISSUES:	REV. DATE
CITY SUBMITTAL 1	06/07/21
CITY SUBMITTAL 2	07/09/21

C1.0

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

RELEASED FOR:	DATE
CITY SUBMITTAL 1	6/7/2021
CITY SUBMITTAL 2	7/8/2021

STATE OF MICHIGAN
JEREMY A. MATTHEI
ENGINEER
NO. 53590
REGISTERED PROFESSIONAL ENGINEER

JEREMY A. MATTHEI
P.E.# 62020 53590

LEGAL DESCRIPTION

Commencing at the S.W. corner of Section 26, T2S, R6E, City of Ann Arbor, Washtenaw County, Michigan, thence N 00°00'00" E 515.92 feet along the west line of said Section 26, thence S 71°47'25" E 372.52 feet along the centerline of Geddes Ave. (formerly Huron River Drive); thence S 18°12'35" W 33.00 to the POINT OF BEGINNING,

thence S 71°47'25" E 316.32 feet ,
thence along the westerly right–of–way line of Huron Parkway in the following two (2) courses:

southeasterly 259.70 feet in the arc of a circular curve to the right, radius 290.00 feet, central angle 51°18'35", chord S 33°59'10" E 251.11 feet,
southeasterly 423.76 feet in the arc of a circular curve to the left, radius 1516.47 feet, central angle 16°00'38", chord S 16°20'21" E 422.38 feet,

thence S 59°28'15" W 57.70 feet,
thence S 85°38'40" W 283.09 feet,
thence S 30°36'31" E 25.37 feet to the S.E. corner of Lot 47 of Riverside Hills Subdivision No. 2, Liber 17 of Plats, Pages 25 and 26, Washtenaw County Records,
thence N 89°36'10" W 186.09 feet along the south line of said Lot 47,
thence along the easterly right–of–way line of Hickory Lane in the following six (6) courses:

northerly 124.27 feet along the arc of a circular curve to the left, radius 202.38 feet, central angle 35°10'52", chord N 06°54'34" W 122.32 feet,
N 24°30'00" W 220.47 feet,
northerly 60.54 feet along the arc of a circular curve to the right, radius 110.45 feet, central angle 31°24'12", chord N 08°46'37" W 59.78 feet,
N 06°54'35" E 315.97 feet,
northerly 63.11 feet along the arc of a circular curve to the right, radius 320.00 feet, central angle 11°18'00", chord N 12°33'35" E 63.01 feet,
N 18°12'35" E 28.87 feet to the N.W. corner of Lot 51 of said Riverside Hills Subdivision No. 2, to the POINT OF BEGINNING, being Lots 47 through 51 inclusive of said Riverside Hills Subdivision No. 2 and a part of the S.W. 1/4 of Section 26, T2S, R6E and a part of the N.W. 1/4 of Section 35, T2S, R6E, City of Ann Arbor, Washtenaw County, Michigan, containing 7.72 acres of land more or less, subject to easements and restrictions of record, if any.

Subject to:

Grant of an Easement to the City of Ann Arbor recorded in Liber 5168, Page 27, Washtenaw County Records.

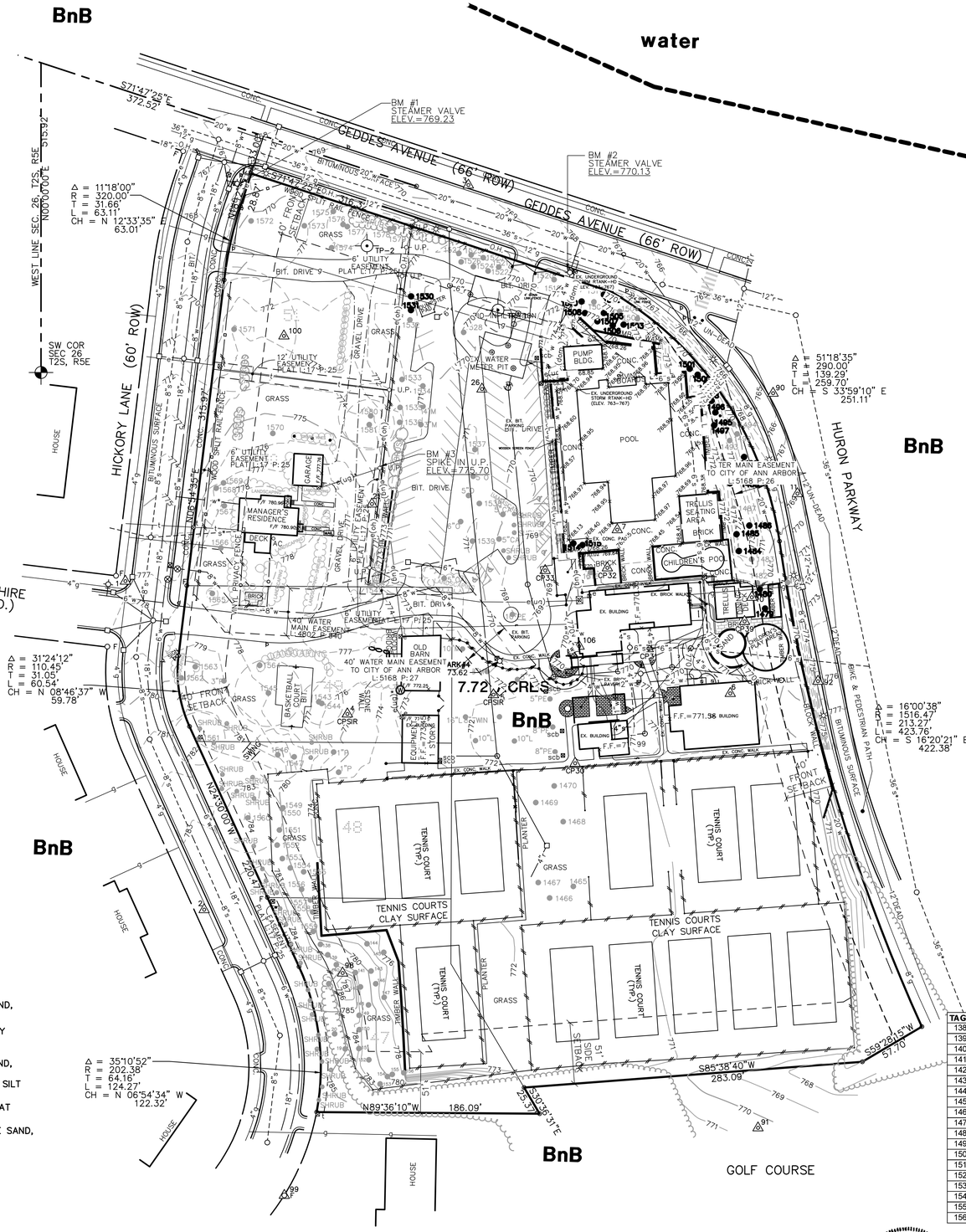
Grant of an Easement to the City of Ann Arbor recorded in Liber 4802, Page 840, Washtenaw County Records.

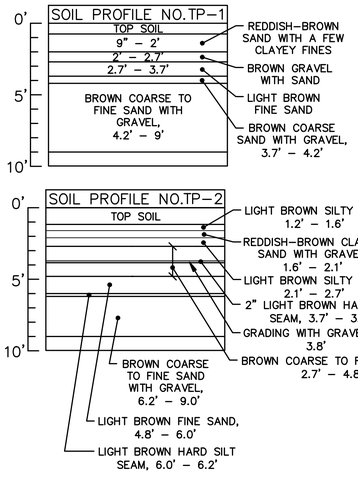
Grant of an Easement to the City of Ann Arbor recorded in Liber 5168, Page 26, Washtenaw County Records.

Grant of an Easement to the City of Ann Arbor recorded in Liber 5168, Page 28, Washtenaw County Records.

NOTE:

Title work was NOT provided for this survey.





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

TREE LIST

TAG #	DBH	COMMON NAME	GENUS/SPECIES	STEMS	SCORE	LM	INV	REMOVAL
1465	19"	Honey Locust	Gleditsia triacanthos					
1466	18"	Honey Locust	Gleditsia triacanthos					
1467	15"	Honey Locust	Gleditsia triacanthos					
1468	20"	Honey Locust	Gleditsia triacanthos					
1469	18"	Honey Locust	Gleditsia triacanthos					
1470	20"	Honey Locust	Gleditsia triacanthos					
1471	7"	Honey Locust	Gleditsia triacanthos					
1472	7"	Sugar Maple	Acer saccharum					
1473	7"	Bradford Pear	Pyrus calleryana					
1474	15"	Sugar Maple	Acer saccharum					
1475	11"	Red Pine	Pinus resinosa					
1476	7"	Red Pine	Pinus resinosa					
1477	9"	Red Pine	Pinus resinosa					
1478	9"	White Pine	Pinus strubus					
1479	18"	Black Pine	Pinus nigra				X	
1480	15"	Black Pine	Pinus nigra				X	
1481	8"	Scotch Pine	Pinus sylvestris				X	
1483	16"	Black Pine	Pinus nigra				X	
1484	15"	Black Pine	Pinus nigra				X	
1485	14"	Black Pine	Pinus nigra				X	
1486	14"	Black Pine	Pinus nigra				X	
1487	20"	Black Pine	Pinus nigra				X	
1488	16"	Black Pine	Pinus nigra				X	
1489	12"	Black Pine	Pinus nigra				X	
1490	19"	Black Pine	Pinus nigra				X	
1491	16"	Black Pine	Pinus nigra				X	
1492	11"	Black Pine	Pinus nigra				X	
1493	18"	Black Pine	Pinus nigra				X	
1494	16"	Black Pine	Pinus nigra				X	
1495	10"	Black Pine	Pinus nigra				X	
1496	15"	Black Pine	Pinus nigra				X	X
1497	15"	Black Pine	Pinus nigra				X	X
1498	13"	Black Pine	Pinus nigra				X	X
1499	16"	Black Pine	Pinus nigra				X	X
1500	17"	Black Pine	Pinus nigra				X	X
1501	18"	Black Pine	Pinus nigra				X	X
1502	6"	White Spruce	Picea glauca					
1503	6"	White Spruce	Picea glauca					X
1504	6"	White Spruce	Picea glauca					
1505	6"	White Spruce	Picea glauca					X
1506	7"	White Spruce	Picea glauca					X
1507	6"	White Spruce	Picea glauca					X
1508	6"	White Spruce	Picea glauca					X
1509	6"	White Spruce	Picea glauca					
1512	12"	Black Pine	Pinus nigra				X	
1513	13"	Black Pine	Pinus nigra				X	X
1514	9"	Black Pine	Pinus nigra				X	X
1515	8"	Black Pine	Pinus nigra				X	X
1517	14"	Black Pine	Pinus nigra				X	
1518	11"	Black Pine	Pinus nigra				X	
1519	14"	Black Pine	Pinus nigra				X	
1520	14"	Black Pine	Pinus nigra				X	
1521	19"	Black Pine	Pinus nigra				X	
1522	13"	Black Pine	Pinus nigra				X	
1523	20"	Black Pine	Pinus nigra				X	
1524	11"	Black Pine	Pinus nigra				X	
1525	17"	Black Pine	Pinus nigra				X	
1526	18"	Black Pine	Pinus nigra				X	
1527	12"	Black Pine	Pinus nigra				X	
1528	8"	Norway Maple	Acer platanoides				X	
1529	6"	White Spruce	Picea glauca					
1530	17"	Black Pine	Pinus nigra				X	X
1531	16"	Black Pine	Pinus nigra				X	X
1532	24"	Black Pine	Pinus nigra				X	
1533	8"	Red Pine	Pinus resinosa					
1534	6"	Sugar Maple	Acer saccharum					
1535	15"	Scotch Pine	Pinus sylvestris				X	
1537	8"	Sugar Maple	Acer saccharum					
1538	8"	White Pine	Pinus strubus					
1539	7"	Norway Spruce	Picea abies					
1540	8"	White Pine	Pinus strubus					
1541	6"	Crab Apple	Malus coronaria					
1543	15"	Black Cherry	Prunus serotina					
1544	18"	Black Cherry	Prunus serotina		15	X		
1545	28"	Black Walnut	Juglans nigra		21	X		
1546	22"	Black Walnut	Juglans nigra		21	X		
1547	11"	White Mulberry	Morus alba	twin			X	
1548		Lost	Tag					
1549	9"	Black Pine	Pinus nigra				X	
1550	8"	Black Pine	Pinus nigra				X	
1551	10"	Black Pine	Pinus nigra				X	
1552	14"	Black Pine	Pinus nigra				X	
1553	9"	Black Pine	Pinus nigra				X	
1554	9"	Black Pine	Pinus nigra				X	
1555	11"	Black Pine	Pinus nigra				X	
1556	10"	Black Pine	Pinus nigra				X	
1557	18"	Black Pine	Pinus nigra				X	
1558	16"	Black Pine	Pinus nigra				X	
1559	15"	Black Pine	Pinus nigra				X	
1560	29"	Cottonwood	Populus deltoides		20	X		
1561	22"	Box Elder	Acer negundo		16	X		
1562	6"	Crab Apple	Malus coronaria					
1563	6"	Crab Apple	Malus coronaria					
1564	6"	Crab Apple	Malus coronaria					
1565	12"	Chinese Elm	Ulmus parvifolia					
1566	11"	Norway Maple	Acer platanoides					X
1567	19"	Sugar Maple	Acer saccharum		20	X		
1568	14"	Catalpa	Catalpa speciosa					X
1569	13"	Catalpa	Catalpa speciosa	twin				X
1570	16"	Black Pine	Pinus nigra					X
1571	52"	American Elm	Ulmus americana		21	X		
1572	19"	Black Pine	Pinus nigra				X	
1573	16"	White Pine	Pinus strubus					
1574	16"	White Pine	Pinus strubus					
1575	15"	White Mulberry	Morus alba				X	
1576	13"	Box Elder	Acer negundo					
1577	17"	Box Elder	Acer negundo		18	X		
1578	28"	Black Locust	Robinia pseudoacacia				X	
1579	33"	Black Locust	Robinia pseudoacacia				X	
1580	27"	Black Walnut	Juglans nigra		19	X		
1581	21"	Black Walnut	Juglans nigra		18	X		

TAG#	COMMON NAME
138	14" Pine
139	13" Pine
140	13" Pine
141	9" Pine
142	9" Pine
143	9" Pine
144	10" Pine
145	9" Pine
146	9" Pine
147	9" Pine
148	9" Pine
149	9" Pine
150	9" Pine
151	9" Pine
152	11" Pine
153	15" Spruce
154	8" Spruce
155	8" Spruce
156	8" Spruce

SCALE: 1" = 50'

0 50 100 150

Know what's below. Call before you dig.

LEGEND

772	EXIST. CONTOUR
×772.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
	ELEC. TRANSFORMER
	EXIST. AC UNIT
	EXIST. GENERATOR
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
	EXIST. HYDRANT
	EXIST. GATE VALVE IN BOX
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
s	EXIST. SANITARY SEWER
	SIGN
t	TELEPHONE RISER
e	ELECTRIC METER
w	WATER METER
scb	SPRINKLER CONTROL BOX
g	GAS METER
	POST
W	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
TP–1	EXIST. TEST PIT LOCATION
F	FOUND IRON PIPE
	CONTROL PT.

NOTES

THE BASE SURVEY WAS PREPARED BY MIDWESTERN CONSULTING IN NOVEMBER 2020. ALL UNDERGROUND UTILITIES AND STRUCTURES HAVE BEEN SHOWN TO A REASONABLE DEGREE OF ACCURACY AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THEIR EXACT LOCATION AND TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO COMMENCING WORK.

BENCHMARKS

BM#1 – STEAMER VALVE
ELEV=769.23 (NAVD88)

BM#2 – STEAMER VALVE
ELEV=770.13 (NAVD88)

BM#3 – SPIKE IN UTILITY POLE
ELEV=775.70 (NAVD88)

BM#4 – TOP NUT OF HYDRANT
ELEV=773.62 (NAVD88)

SOILS DESCRIPTION

BASED ON SOIL SURVEY OF WASHTENAW COUNTY MICHIGAN

BnB – BOYER LOAMY SAND, 0 TO 6 PERCENT SLOPES

SURVEYOR'S CERTIFICATE

To: Racquet Club of Ann Arbor

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2021 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes NO Items of Table A thereof. The fieldwork was completed on October 15, 2020.

Date of Plat or Map: June 3, 2021

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

Patrick L. Hastings, PS 37277

MIDWESTERN CONSULTING
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CLIENT
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734–216–0579

RACQUET CLUB OF ANN ARBOR

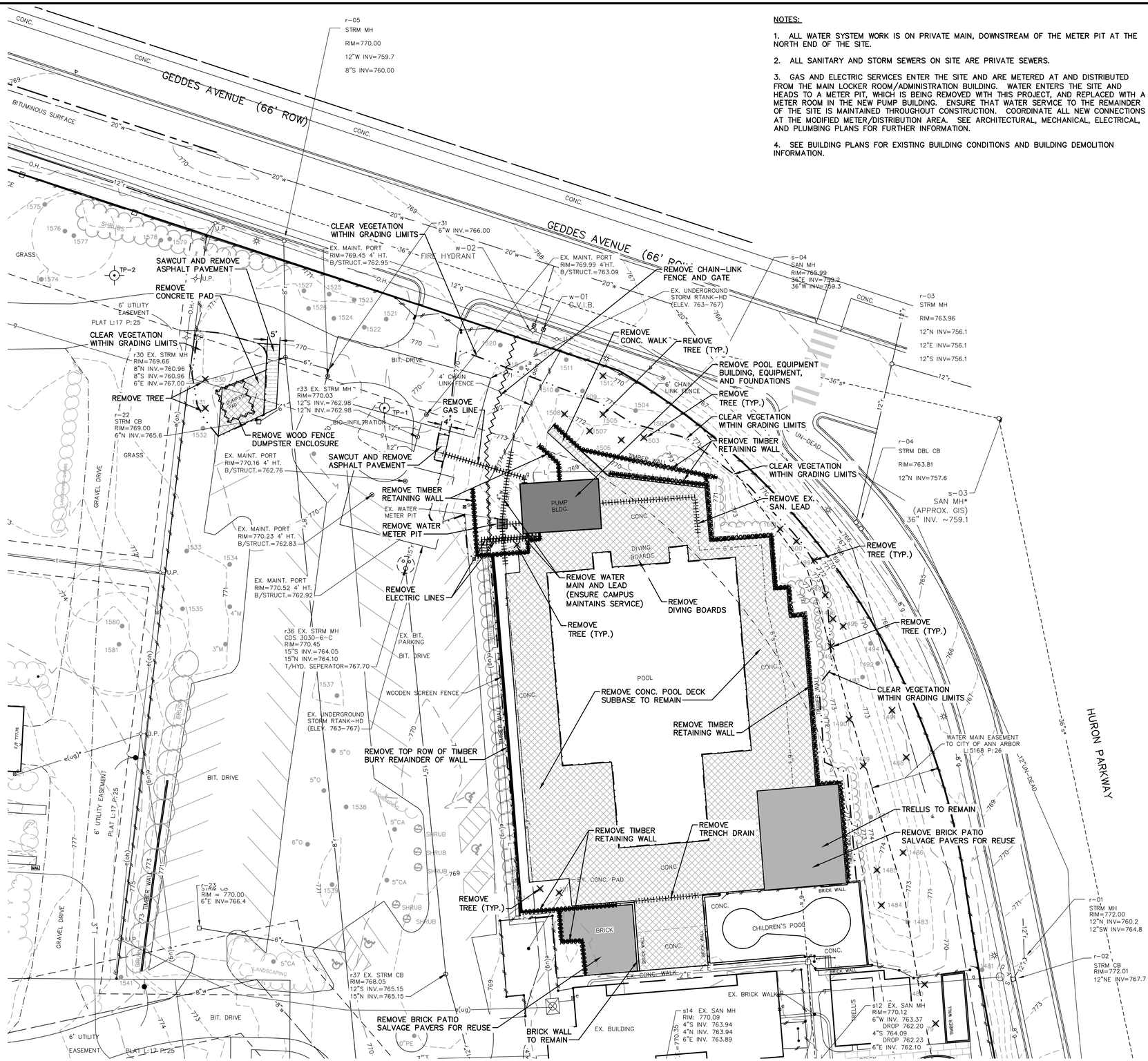
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
ALTA TOPOGRAPHIC SURVEY

C1.1

DATE: 7/8/2021
SHEET 2 OF 25
CADD: JBB
ENG: JAM
PM: ROW
TECH:
2021SEX1.dwg

JOB No. 20213

ISSUED:
CITY SUBMITTAL 1 07–09–21
CITY SUBMITTAL 2



NOTES:

1. ALL WATER SYSTEM WORK IS ON PRIVATE MAIN, DOWNSTREAM OF THE METER PIT AT THE NORTH END OF THE SITE.

2. ALL SANITARY AND STORM SEWERS ON SITE ARE PRIVATE SEWERS.

3. GAS AND ELECTRIC SERVICES ENTER THE SITE AND ARE METERED AT AND DISTRIBUTED FROM THE MAIN LOCKER ROOM/ADMINISTRATION BUILDING. WATER ENTERS THE SITE AND HEADS TO A METER PIT, WHICH IS BEING REMOVED WITH THIS PROJECT, AND REPLACED WITH A METER ROOM IN THE NEW PUMP BUILDING. ENSURE THAT WATER SERVICE TO THE REMAINDER OF THE SITE IS MAINTAINED THROUGHOUT CONSTRUCTION. COORDINATE ALL NEW CONNECTIONS AT THE MODIFIED METER/DISTRIBUTION AREA. SEE ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING PLANS FOR FURTHER INFORMATION.

4. SEE BUILDING PLANS FOR EXISTING BUILDING CONDITIONS AND BUILDING DEMOLITION INFORMATION.

SCALE: 1" = 20'

0 20 40 60

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

LEGEND

- EXIST. CONTOUR
- EXIST. SPOT ELEVATION
- EXIST. UTILITY POLE
- GUY WIRE
- EXIST. OVERHEAD UTILITY LINE
- EXIST. LIGHT POLE
- EXIST. GAS LINE
- EXIST. WATER MAIN
- EXIST. HYDRANT
- EXIST. GATE VALVE IN BOX
- EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- EXIST. SANITARY SEWER
- SIGN
- GAS METER
- POST
- FENCE
- SINGLE TREE
- TREE OR BRUSH LIMIT
- EXIST. TEST PIT LOCATION
- CONTROL PT.
- REMOVE BUILDING
- REMOVE CONCRETE
- REMOVE ASPHALT PAVEMENT
- REMOVE BRICK
- REMOVE RETAINING WALL
- REMOVE UTILITY
- REMOVE FENCE
- REMOVE TREE

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BRENT SCHOMAKER
734-216-0579

RACQUET CLUB OF ANN ARBOR

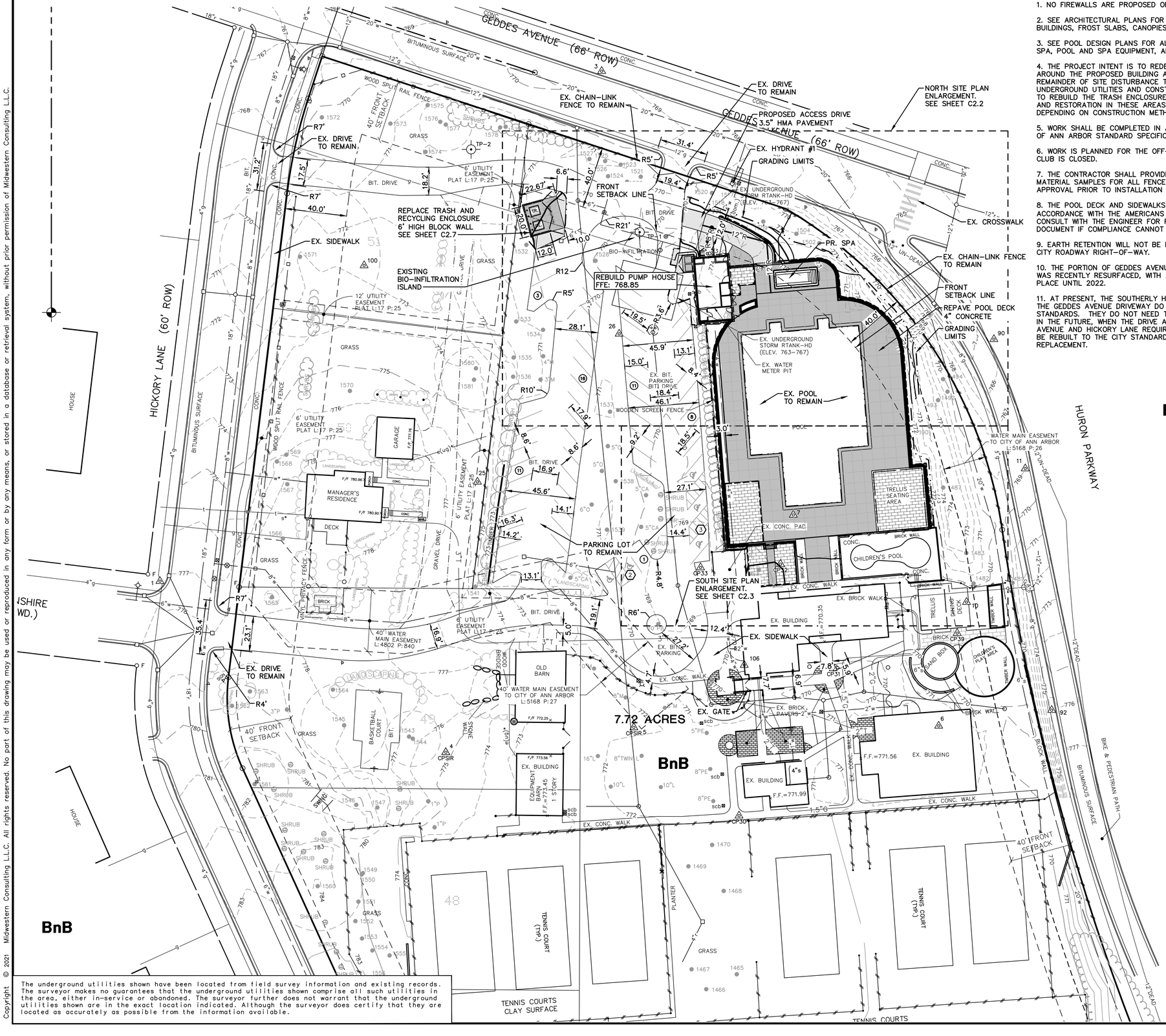
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
DEMOLITION PLAN

C1.2

JOB No. 20213

ISSUED:
CITY SUBMITTAL 1 — 07-09-21
CITY SUBMITTAL 2

DATE: 7/8/2021
SHEET 3 OF 25
REV. DATE
CADD: JBB
ENG: JAM
PM: ROW
TECH:
20213DE1.dwg



BnB

NOTES:

1. NO FIREWALLS ARE PROPOSED OR EXISTING FOR THIS PROJECT.
2. SEE ARCHITECTURAL PLANS FOR ALL WORK RELATED TO BUILDINGS, FROST SLABS, CANOPIES, AND TRELLISES.
3. SEE POOL DESIGN PLANS FOR ALL WORK RELATED TO THE SPA, POOL AND SPA EQUIPMENT, AND POOL AND SPA PIPING.
4. THE PROJECT INTENT IS TO REDEVELOP THE SECTION OF SITE AROUND THE PROPOSED BUILDING AND SPA, AND MINIMIZE THE REMAINDER OF SITE DISTURBANCE TO THAT REQUIRED TO INSTALL UNDERGROUND UTILITIES AND CONSTRUCT RETAINING WALLS, AND TO REBUILD THE TRASH ENCLOSURE. PAVEMENT DISTURBANCE AND RESTORATION IN THESE AREAS MAY VARY SLIGHTLY DEPENDING ON CONSTRUCTION METHODS.
5. WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE CITY OF ANN ARBOR STANDARD SPECIFICATIONS FOR CONSTRUCTION.
6. WORK IS PLANNED FOR THE OFF-SEASON WHEN THE RACQUET CLUB IS CLOSED.
7. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND MATERIAL SAMPLES FOR ALL FENCE AND GATE COMPONENTS, FOR APPROVAL PRIOR TO INSTALLATION OR DELIVERY TO THE SITE.
8. THE POOL DECK AND SIDEWALKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA). CONSULT WITH THE ENGINEER FOR FURTHER GUIDANCE AND TO DOCUMENT IF COMPLIANCE CANNOT BE ATTAINED IN ANY AREAS.
9. EARTH RETENTION WILL NOT BE REQUIRED OR USED IN THE CITY ROADWAY RIGHT-OF-WAY.
10. THE PORTION OF GEDDES AVENUE FRONTING THIS PROJECT WAS RECENTLY RESURFACED, WITH A STREET CUT MORATORIUM IN PLACE UNTIL 2022.
11. AT PRESENT, THE SOUTHERLY HICKORY LANE DRIVEWAY AND THE GEDDES AVENUE DRIVEWAY DO NOT MEET CURRENT CITY STANDARDS. THEY DO NOT NEED TO REPLACED CURRENTLY, BUT IN THE FUTURE, WHEN THE DRIVE APPROACHES ALONG GEDDES AVENUE AND HICKORY LANE REQUIRE REPLACEMENT, THEY MUST BE REBUILT TO THE CITY STANDARDS CURRENT AT THE TIME OF REPLACEMENT.

SCALE: 1" = 30'

0 30 60 90

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

LEGEND

772	EXIST. CONTOUR
772	PROP. CONTOUR
U.P.	EXIST. UTILITY POLE
	GUY WIRE
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
	EXIST. HYDRANT
	EXIST. GATE VALVE IN BOX
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
s	EXIST. SANITARY SEWER
	SIGN
	GAS METER
	POST
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
TP-1	EXIST. TEST PIT LOCATION
	CONTROL PT.
	CONCRETE
	3.5" ASPHALT PAVEMENT
R	PROP. STORM SEWER
	PROP. CATCH BASIN OR INLET

SITE DATA ANALYSIS

I. Site Use

Existing Zoning	AG
Proposed Zoning	AG
Gross Site Area	7.86 Acres
Total Net Site Area	7.86 Acres
Number of Units	1
Space Use Summary	
Managers Residence (GFA)	1,420 SF
Locker Room/Administration Building	3,638 SF
Snack Shack	851 SF
Tennis Building	3,533 SF
New Pump House Building	935 SF
	10,377 SF Total

II. Zoning Comparison Information

	Required	Provided
Minimum Area per Dwelling Unit	100,000 SF	342,382 SF
Front Setback (Min./Max.)*	30/40 FT	40.4
Rear Setback	50 FT	266.6
Side Setback (South)	10% LOT WIDTH EQUALS 51 FT	587.6
Maximum Building Height	30 FT	22.5 FT
Minimum Lot Size	100,000 SF	342,382 SF
Minimum Lot Width	200 FT	515 FT

* To Building walls

III. Parking Requirements

	Required	Provided
1 space per 200 SF required =	52	55
Barrier Free spaces	3	5
1 bicycle space per 1000 SF	11	12
100% CL C	11	12

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RACQUET CLUB OF ANN ARBOR

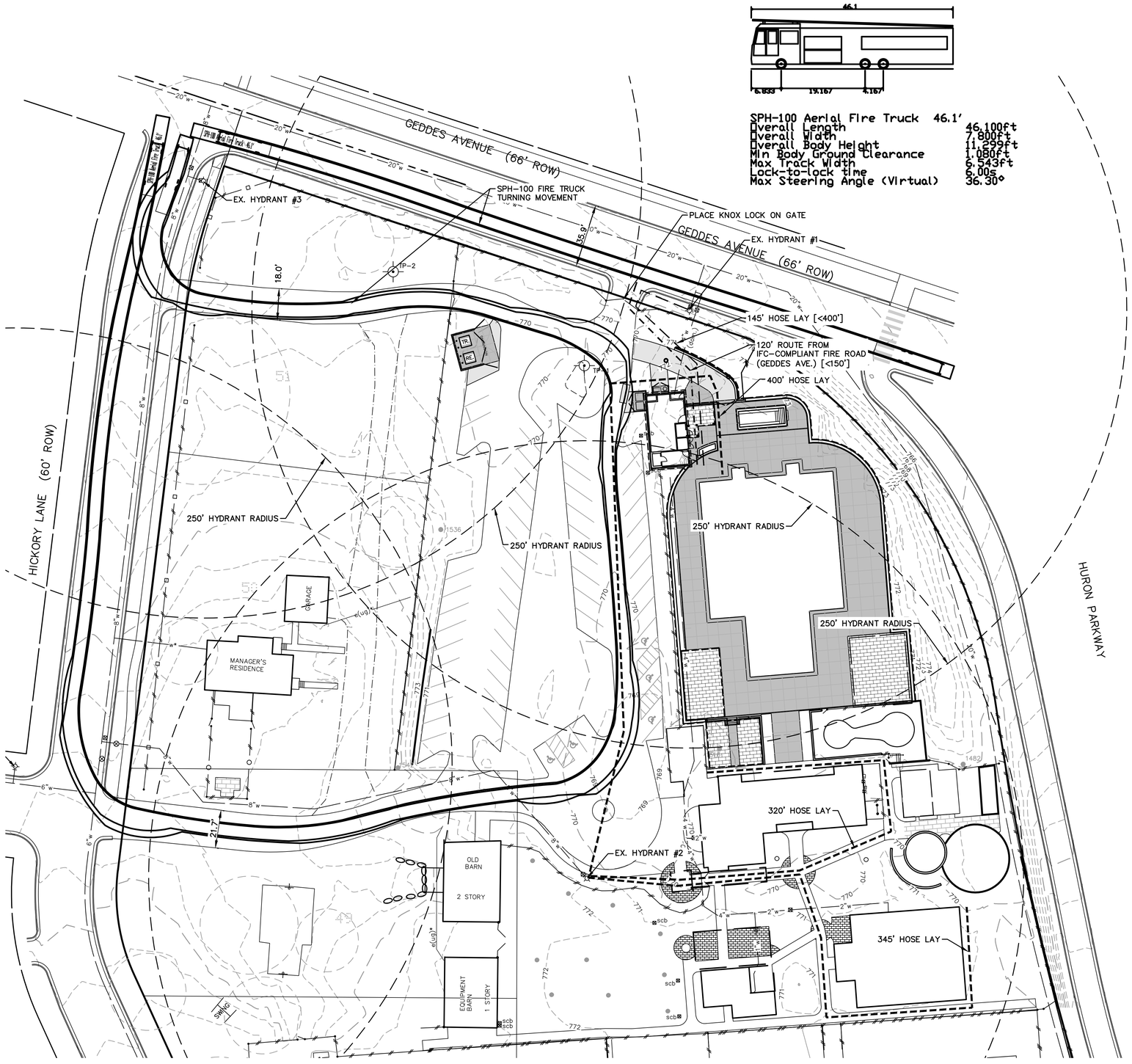
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
OVERALL SITE PLAN

C2.0

DATE: 7/7/2021
SHEET 4 OF 25
CADD: JBB
ENG: JAM
PM: ROW
TECH:
20213SP1.dwg

JOB No. 20213

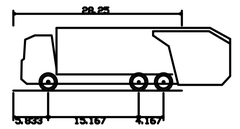
ISSUED:	REV. DATE
CITY SUBMITTAL 1	09-09-21
CITY SUBMITTAL 2	07-09-21



FIRE SAFETY PLAN

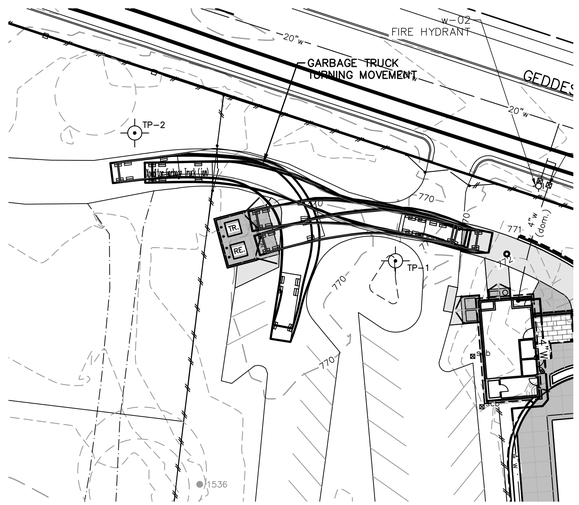
SPH-100 Aerial Fire Truck 46.1'

Overall Length	46.100ft
Overall Width	7.800ft
Overall Body Height	11.299ft
Min Body Ground Clearance	1.050ft
Max Track Width	6.543ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	36.30°



Xpediter Garbage Truck

Overall Length	28.250ft
Overall Width	8.420ft
Overall Body Height	10.525ft
Min Body Ground Clearance	0.978ft
Track Width	8.250ft
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	32.905ft



TRASH TRUCK TURNING MOVEMENT

SCALE: 1" = 30'

0 30 60 90

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

LEGEND

- EXIST. WATER MAIN
- EXIST. HYDRANT
- EXIST. GATE VALVE IN BOX
- SPRINKLER CONTROL BOX
- POST
- FENCE
- SINGLE TREE
- EXIST. TEST PIT LOCATION
- CONCRETE
- 3.5" ASPHALT PAVEMENT

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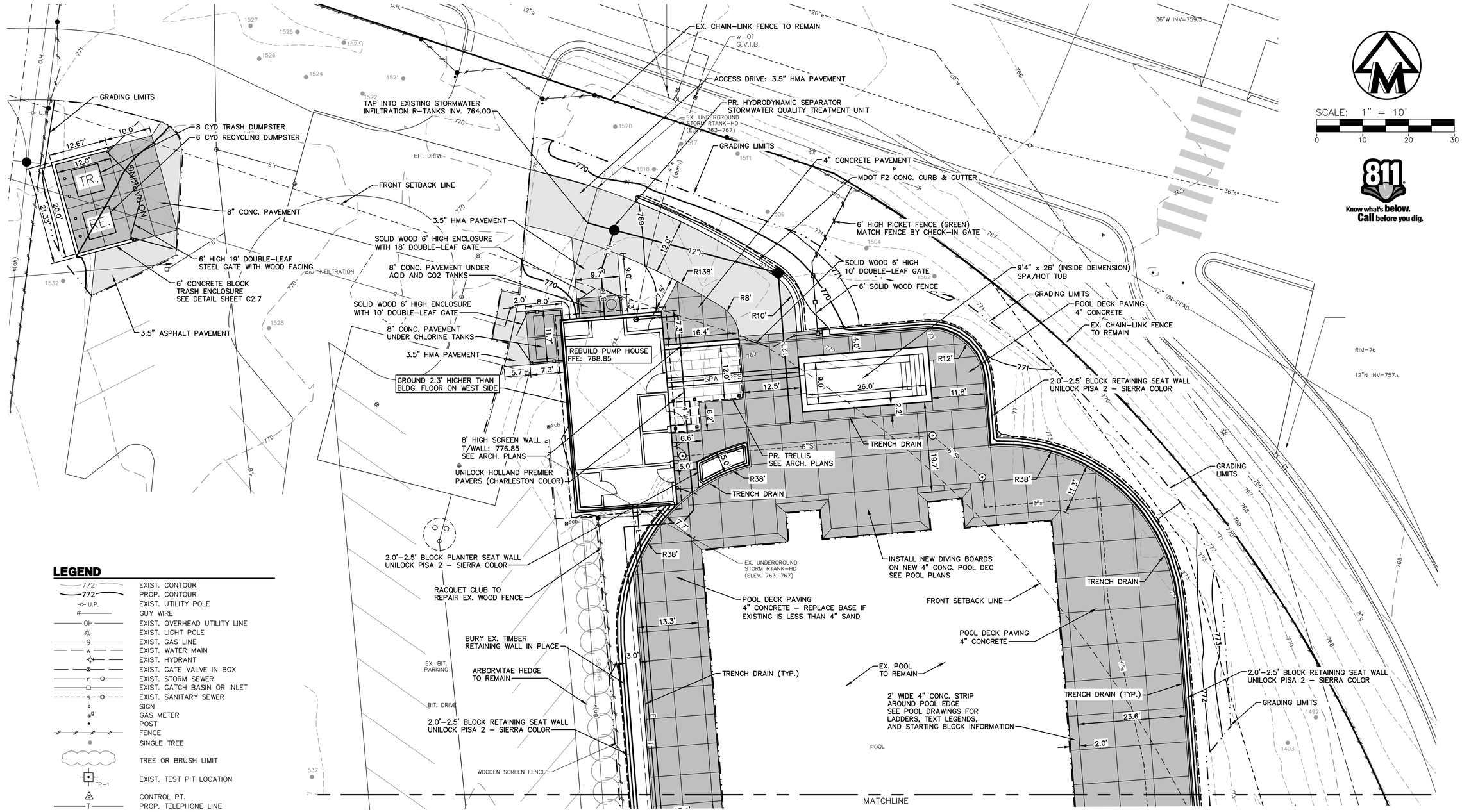
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
FIRE SAFETY PLAN & TRASH TRUCK MOVEMENTS

C2.1

JOB No. 20213

ISSUED:	REV. DATE:
CITY SUBMITTAL 1	06-22-21
CITY SUBMITTAL 2	07-09-21

DATE: 7/6/2021
SHEET 5 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
20213SP3.dwg



LEGEND

- EXIST. CONTOUR
- PROP. CONTOUR
- EXIST. UTILITY POLE
- GUY WIRE
- EXIST. OVERHEAD UTILITY LINE
- EXIST. LIGHT POLE
- EXIST. GAS LINE
- EXIST. WATER MAIN
- EXIST. HYDRANT
- EXIST. GATE VALVE IN BOX
- EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- EXIST. SANITARY SEWER
- SIGN
- GAS METER
- POST
- FENCE
- SINGLE TREE
- TREE OR BRUSH LIMIT
- EXIST. TEST PIT LOCATION
- CONTROL PT.
- PROP. TELEPHONE LINE
- PROP. ELECTRIC LINE
- PROP. STORM SEWER
- PROP. CATCH BASIN OR INLET
- PROP. WATER MAIN
- PROP. SANITARY SEWER
- PROP. CLEANOUT
- CONCRETE
- 3.5" ASPHALT PAVEMENT

NOTE: TRENCH DRAIN SHALL BE ACODRAIN K100 4" WIDE ADA TRENCH DRAIN WITH 465D STAINLESS STEEL ADA GRATE - CLASS 'C' LOADING (1,150 PSI)

PICKET FENCE SHALL BE HARTFORD GREEN 6' HEIGHT ALUMINUM COMMERCIAL-GRADE

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RACQUET CLUB OF ANN ARBOR

PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
LAYOUT & MATERIALS PLAN - NORTH

C2.2

JOB No. 20213

ISSUED:
CITY SUBMITTAL 1 06-25-21
CITY SUBMITTAL 2 07-09-21

REV. DATE

DATE: 7/7/2021
SHEET 6 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
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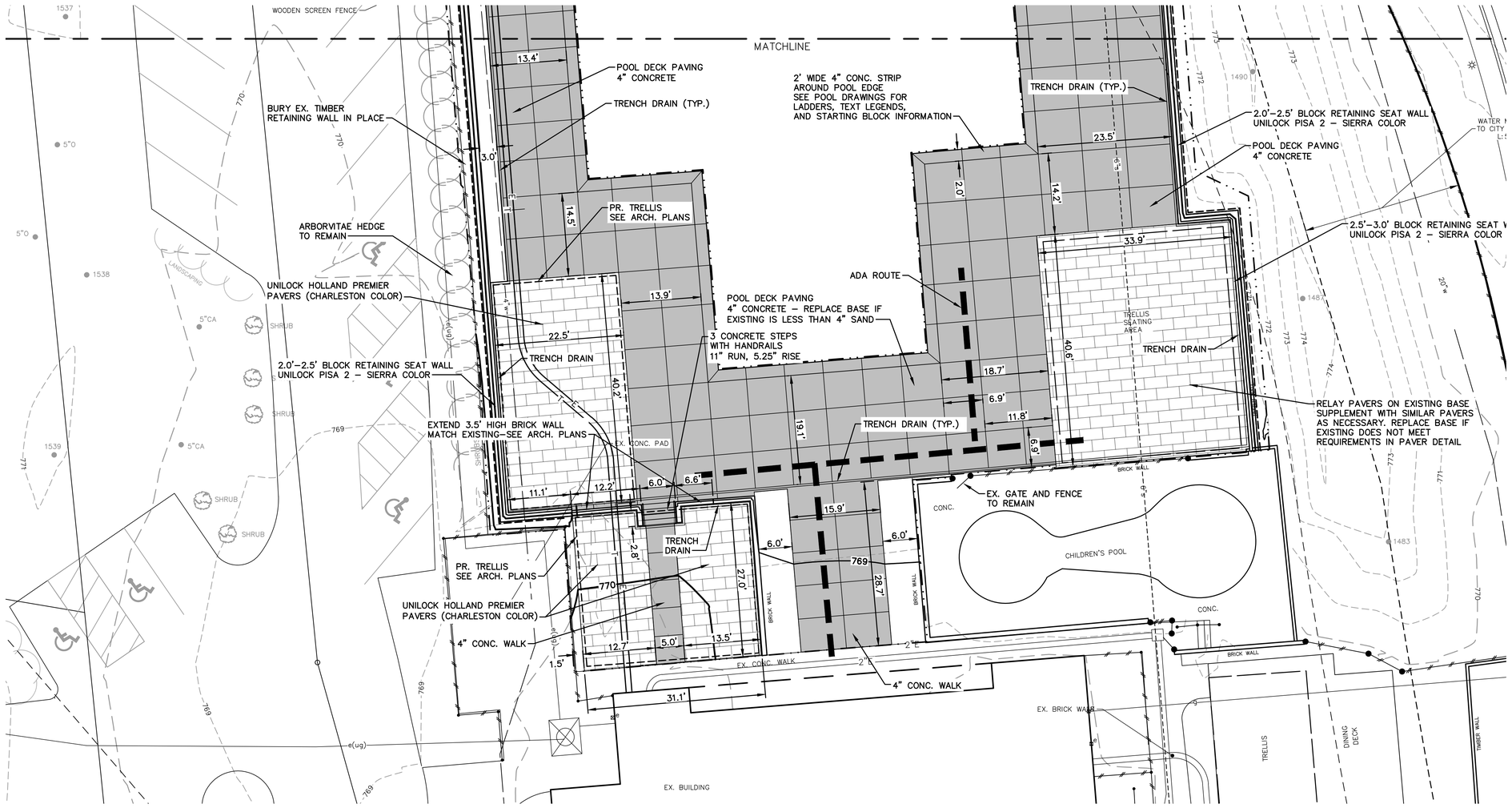

SCALE: 1" = 10'

0 10 20 30

Know what's below. Call before you dig.

LEGEND

772	EXIST. CONTOUR
772	PROP. CONTOUR
U.P.	EXIST. UTILITY POLE
	GUY WIRE
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
	EXIST. HYDRANT
	EXIST. GATE VALVE IN BOX
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
s	EXIST. SANITARY SEWER
	SIGN
g	GAS METER
	POST
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
TP-1	EXIST. TEST PIT LOCATION
	CONTROL PT.
T	PROP. TELEPHONE LINE
E	PROP. ELECTRIC LINE
	CONCRETE
	3.5" ASPHALT PAVEMENT

NOTE: TRENCH DRAIN SHALL BE ACODRAIN K100 4" WIDE ADA TRENCH DRAIN WITH 465D STAINLESS STEEL ADA GRATE - CLASS 'C' LOADING (1,150 PSI)

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RACQUET CLUB OF ANN ARBOR

PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
LAYOUT & MATERIALS PLAN - SOUTH

C2.3

JOB No. 20213

ISSUED:	REV. DATE
CITY SUBMITTAL 1	06-23-21
CITY SUBMITTAL 2	07-09-21

DATE: 7/7/2021
SHEET 7 OF 25
CADD: JRB
ENG: JAM
PM: RCW
TECH:
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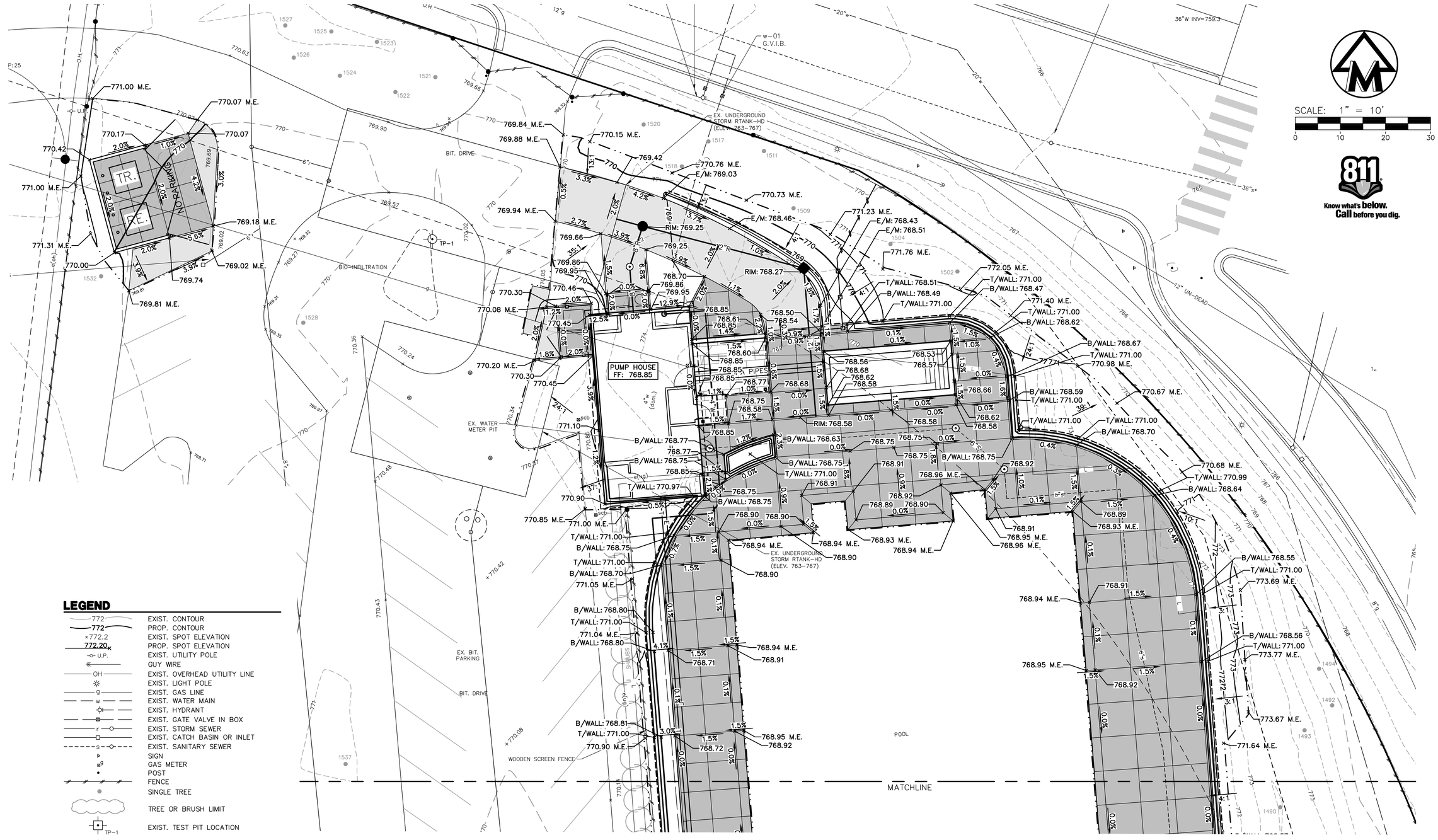

LEGEND

772	EXIST. CONTOUR
772	PROP. CONTOUR
×772.2	EXIST. SPOT ELEVATION
772.20×	PROP. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
	EXIST. HYDRANT
	EXIST. GATE VALVE IN BOX
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
s	EXIST. SANITARY SEWER
	SIGN
	GAS METER
	POST
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
TP-1	EXIST. TEST PIT LOCATION
	CONTROL PT.
T	PROP. TELEPHONE LINE
E	PROP. ELECTRIC LINE
R	PROP. STORM SEWER
	PROP. CATCH BASIN OR INLET
W	PROP. WATER MAIN
S	PROP. SANITARY SEWER
	PROP. CLEANOUT
	CONCRETE
	3.5" ASPHALT PAVEMENT

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RACQUET CLUB OF ANN ARBOR

PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
GRADING PLAN - NORTH

C2.4

JOB No. 20213

ISSUED:	REV. DATE
CITY SUBMITTAL 1	07-09-21
CITY SUBMITTAL 2	

DATE: 7/6/2021
SHEET 8 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
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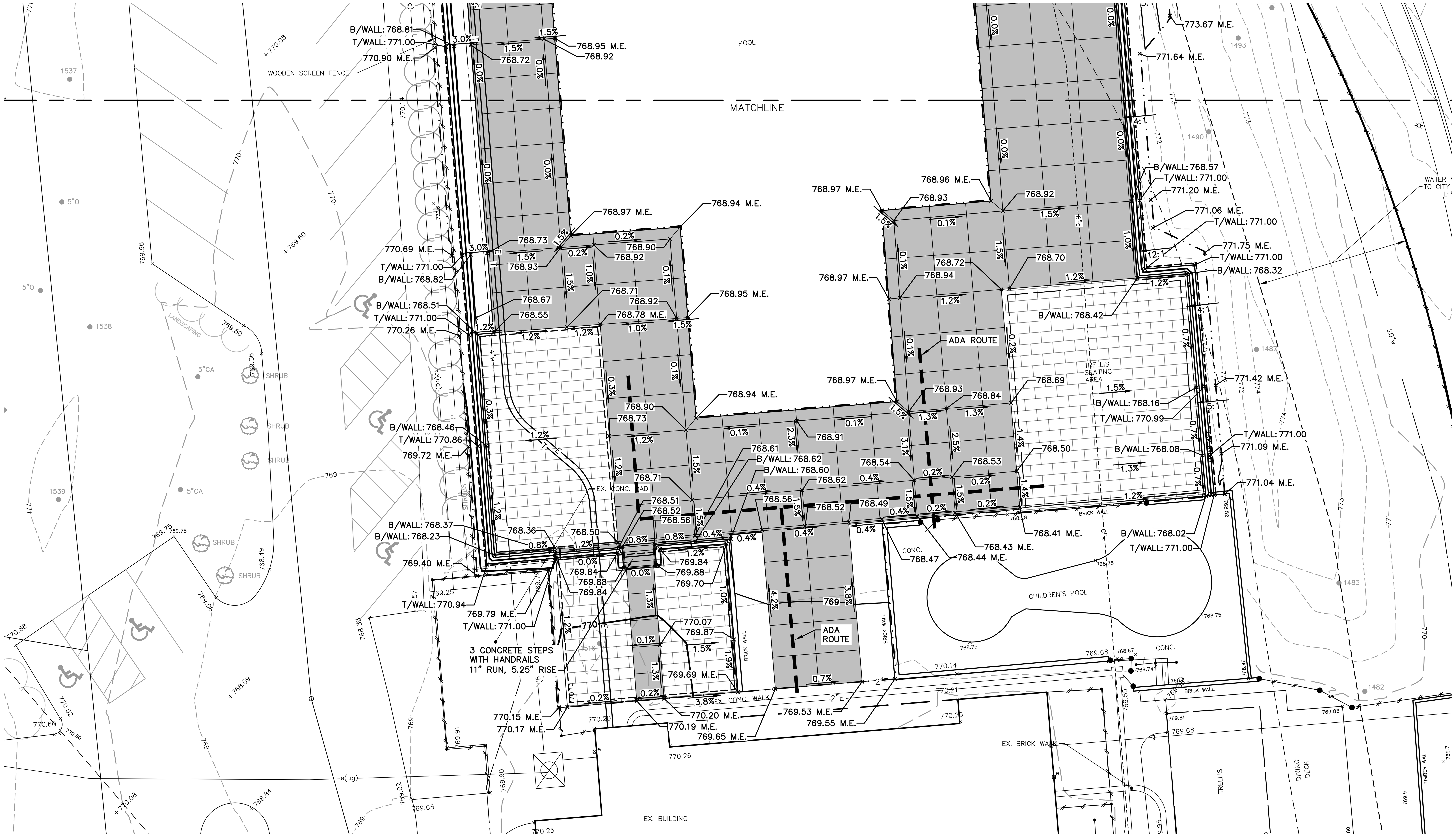

SCALE: 1" = 10'

0 10 20 30

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

LEGEND

772	EXIST. CONTOUR
772	PROP. CONTOUR
×772.2	EXIST. SPOT ELEVATION
772.20×	PROP. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
	GUY WIRE
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
	EXIST. HYDRANT
	EXIST. GATE VALVE IN BOX
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
s	EXIST. SANITARY SEWER
	SIGN
g	GAS METER
	POST
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
TP-1	EXIST. TEST PIT LOCATION
	CONTROL PT.
T	PROP. TELEPHONE LINE
E	PROP. ELECTRIC LINE
	CONCRETE
	3.5" ASPHALT PAVEMENT

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RACQUET CLUB OF ANN ARBOR

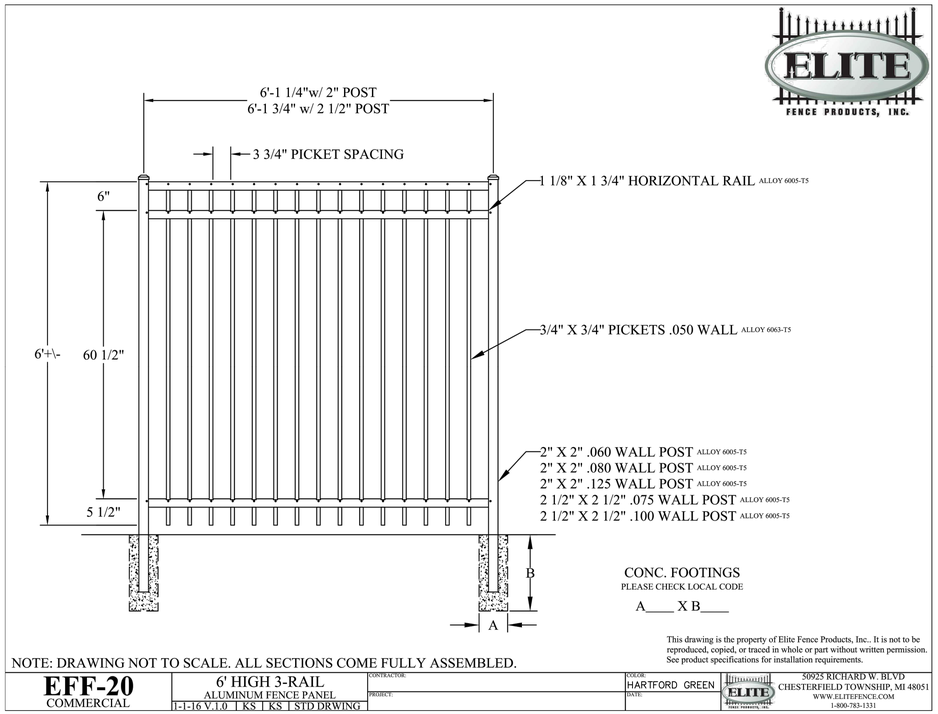
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
GRADING PLAN – SOUTH

C2.5

DATE: 7/6/2021	SHEET 9 OF 25
CADD: JBB	ENG: JAM
PM: RCW	TECH:
20213GP1.dwg	

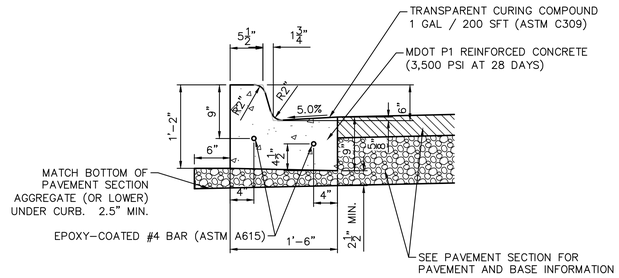
JOB No. **20213**

ISSUED:	REV. DATE
CITY SUBMITTAL 1	06-07-21
CITY SUBMITTAL 2	07-09-21



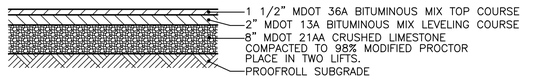
ALUMINUM PICKET FENCE

NOT TO SCALE



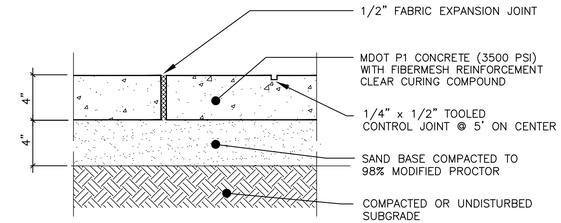
18" MDOT F2 CONCRETE BARRIER CURB AND GUTTER

1"=1' MODIFIED FOR 5.0% GUTTER CROSS-SLOPE



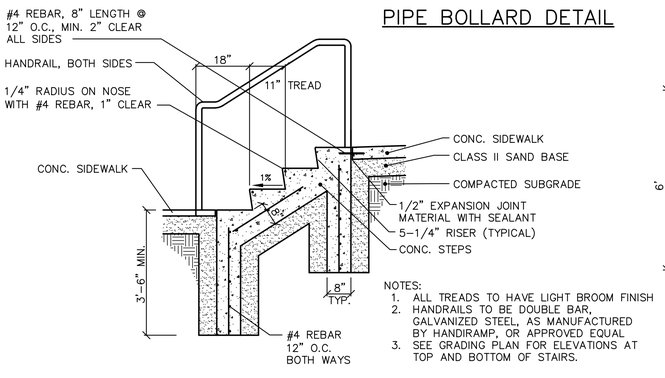
BITUMINOUS PAVEMENT DETAIL (PARKING LOT)

NOT TO SCALE



CONCRETE SIDEWALK AND POOL DECK DETAIL

NOT TO SCALE

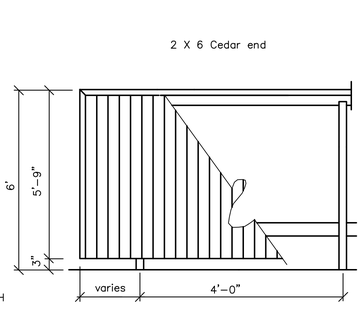


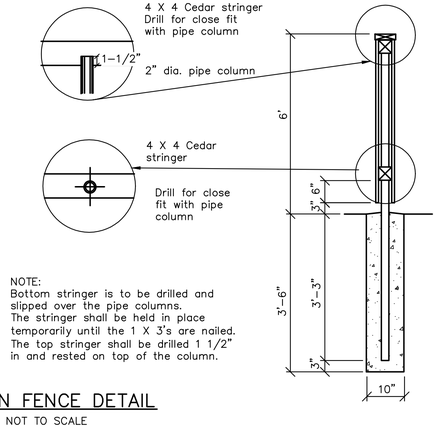
PIPE BOLLARD DETAIL

NOTES:
1. ALL TREADS TO HAVE LIGHT BROOM FINISH
2. HANDRAILS TO BE DOUBLE BAR, GALVANIZED STEEL, AS MANUFACTURED BY HANDIRAMP, OR APPROVED EQUAL
3. SEE GRADING PLAN FOR ELEVATIONS AT TOP AND BOTTOM OF STAIRS.

CONCRETE STAIR DETAILS

NOT TO SCALE

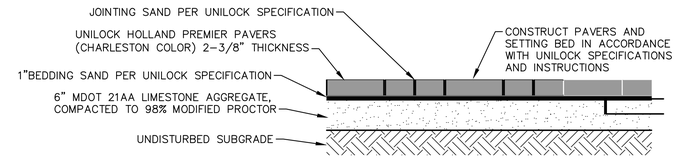




NOTE:
Bottom stringer is to be drilled and slipped over the pipe columns. The stringer shall be held in place temporarily until the 1 X 3's are nailed. The top stringer shall be drilled 1 1/2" in and rested on top of the column.

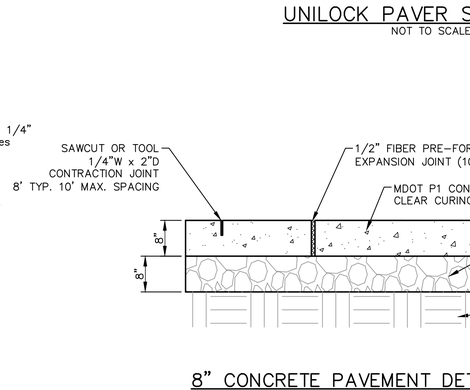
SCREEN FENCE DETAIL

NOT TO SCALE



UNILOCK PAVER SECTION

NOT TO SCALE



8" CONCRETE PAVEMENT DETAIL

SCALE: 1"=1'

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RACQUET CLUB OF ANN ARBOR

PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
PAVING AND SITE DETAILS

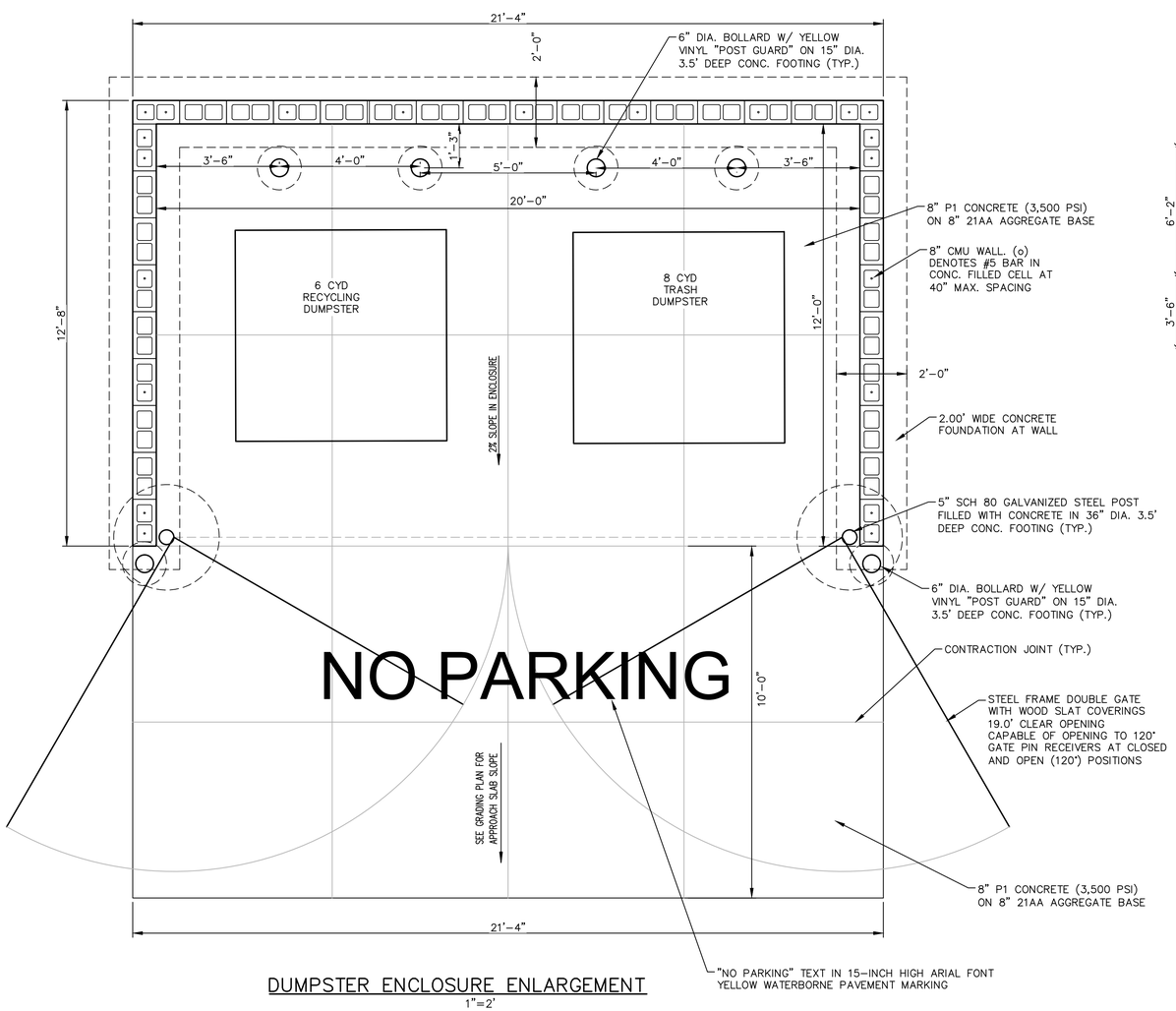
C2.6

DATE: 7/8/2021
SHEET 10 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
20213DT1.dwg

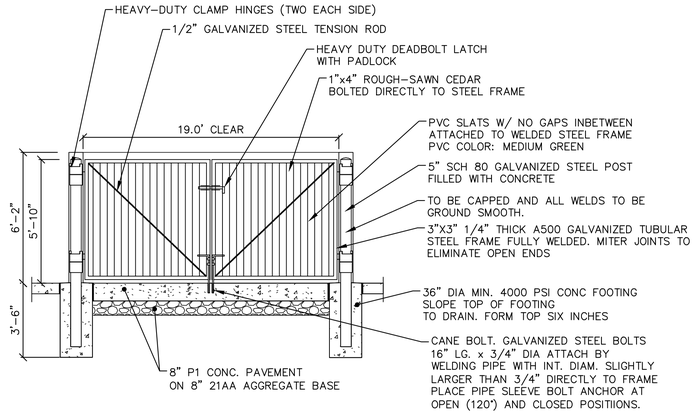
REV.	DATE
1	07-09-21

JOB No. 20213

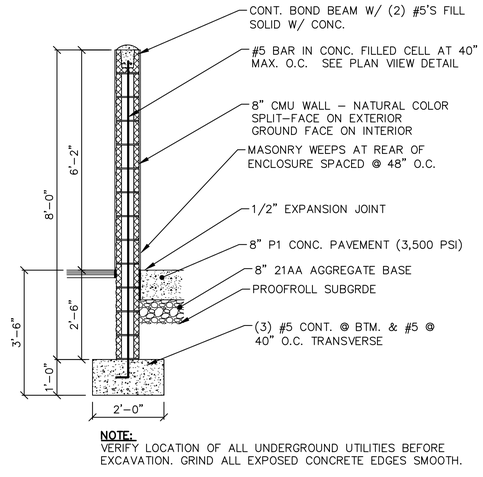
ISSUED:
CITY SUBMITTAL 1
CITY SUBMITTAL 2



DUMPSTER ENCLOSURE ENLARGEMENT
1"=2'

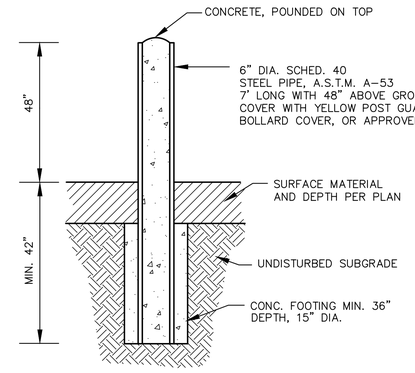


DUMPSTER ENCLOSURE GATE DETAIL
NOT TO SCALE



NOTE:
VERIFY LOCATION OF ALL UNDERGROUND UTILITIES BEFORE EXCAVATION. GRIND ALL EXPOSED CONCRETE EDGES SMOOTH.

DUMPSTER ENCLOSURE WALL SECTION
NOT TO SCALE



PIPE BOLLARD DETAIL
NOT TO SCALE

TRASH & RECYCLING NARRATIVE:

THE RACQUET CLUB OF ANN ARBOR CURRENTLY GENERATES APPROXIMATELY 7 CYD OF TRASH AND 5 CYD OF RECYCLING EACH WEEK, WHICH CAN BE SERVICED WITH A SINGLE WEEKLY PICKUP OF AN 8 CYD TRASH DUMPSTER AND A 6 CYD RECYCLING DUMPSTER. EXTRA PICKUPS ARE ORDERED ON RARE OCCASIONS FOR ADDITIONAL COLLECTION. THESE VALUES WILL NOT CHANGE RESULTING FROM THE WORK IN THIS PROJECT, AND AN 8 CYD TRASH DUMPSTER AND 6 CYD RECYCLING DUMPSTER WILL CONTINUE TO BE ADEQUATE FOR THE PROPERTY.

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PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
DUMPSTER ENCLOSURE AND BOLLARD DETAILS

C2.7

JOB No. 20213

ISSUED:
CITY SUBMITTAL 1 — REV. DATE: 05-28-21
CITY SUBMITTAL 2 — REV. DATE: 07-09-21

DATE: 7/8/2021
SHEET 11 OF 25
CADD: JRB
ENG: JAM
PM: RCW
TECH:
2021301T.dwg

Pisa2™

CLASSIC

BEECHWOOD | CHARCOAL | GRANITE | RUSTIC RED | SANDSTONE | ST. CLAIR

SIERRA COLOR TO BE USED

		Tapered Split	Corner Dbl Split	Coping
Bundle Type		SINGLE	SINGLE	SINGLE
		MICHIGAN	MICHIGAN	MICHIGAN
Thickness (mm)		150MM	150MM	75MM
Dimension mm		200mm x 150mm x 300mm	300mm x 150mm x 200mm	300mm x 75mm x 300mm
Dimension Imperial		7 7/8" x 5 7/8" x 11 7/8"	11 7/8" x 5 7/8" x 7 7/8"	11 7/8" x 3" x 11 7/8"
FCFT PER	Bundle	20.00	20.17	20.34
	Layer	6.67000	6.72000	2.91000
	Stone	0.67	1.68	0.48
PER BUNDLE	Layers	3.00	3.00	7.00
	Sections	2.00	4.00	2.00
LNFT PER	Bundle	40.00	-	82.95
	Unit	1.33	-	1.97
UNITS PER	SqFt	1.50	0.59	2.06
	Section	15.00	3.00	21.00
	Bundle	30.00	12.00	42.00
LBS PER	Layer	860	440	393
	Section	1,290	330	1,375
	Bundle	2,580	1,320	2,750

TAPERED
8 x 12 x 6"
200 x 300 x 150mm

CORNER
8 x 12 x 6"
200 x 300 x 150mm

(12 rights + 12 lefts per bundle)

PISA COPING
12 x 12 x 3"
300 x 300 x 75mm

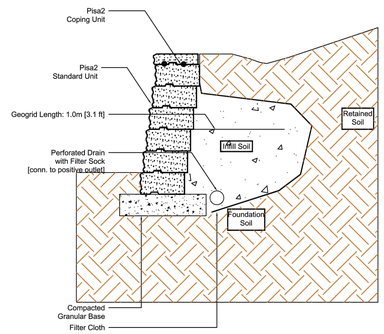
Notes: Colors shown should be used only as a guide. Colors should always be chosen from actual samples. Tapered units will allow for a minimum 5ft. outside radius. To achieve this radius, you must use stones of the same taper on one layer, and stones of the opposite taper on the next layer. Higher walls can be achieved using geogrid reinforcement. 12" Product sold at factory in full bundle quantities. Ask your dealer about purchasing lesser quantities as necessary.
Unilock through Rio Stone® Systems International, can provide preliminary site engineering for most commercial projects. Soils information, site drawings, and loading requirements are some of the information details required in order to provide you with this preliminary site engineering. Contact your local Unilock representative for details. Retaining wall engineering software is also available free of charge at www.unilock.com.

UNILOCK 47

RETAINING WALL PRODUCT INFORMATION

NOT TO SCALE

TYPICAL SECTION - NOT FOR CONSTRUCTION



Design Specific Geometric Information

Retaining Wall System	Pisa2 w/ Geogrid	Geogrid Type and Manufacturer	See Notes
Maximum Height mm (in)	990 (38)	Minimum Geogrid LTDS kN/m (lb/ft)	See Notes
Maximum Slope Above Wall	1V:3H	Maximum Slope Below Wall	None
Max. Surcharge Above Wall kPa (lb/sq.ft)	None	Depth of Embedment mm (in)	153 (6)
Batter of Wall	7.12 °	Compacted Base Dimension mm (in)	610 x 153 (24 x 6)

Design Specific Soil Information

	Soil Region				
	Infill	Retained	Foundation	Base	Drainage
Description (by USCS)	GW Well graded, free draining Granular	CL Inorganic Clays Low Plasticity	CL Inorganic Clays Low Plasticity	GW Well graded, free draining Granular	see infill
Effective Internal Friction Angle	35	28	28	39	NR
Moist Unit Weight kN/cu.m (lb/cu.ft)	22 (140)	20 (127)	20 (127)	22 (140)	NR
Effective Cohesion kPa (lb/sq.ft)	NR	NR	NR	NR	NR
Soil Notes	Placed in 150mm (6") lifts and compacted to 95 % SPD.	Undisturbed dense soil or well compacted Eng. fill.		Allowable bearing cap.must exceed 50kPa (1050 psf).	Crushed Gravel (free draining) compacted to 98 % SPD.	Gravel infill must be well graded, angular, free drain w/max. 8% fines

NR - Not Required
Notes:
1. This design meets or exceeds the minimum factors of safety required by Risi Stone Systems based on the design parameters listed above. The analysis was performed as outlined in the National Concrete Masonry Association Design Manual for Segmental Retaining Walls, Third Edition. This is a typical, non site-specific Design.
2. No analysis of global stability, total or differential settlement, or seismic effects has been performed.
3. This design is only provided to illustrate the general arrangement of the SRW structure for preliminary costing and feasibility purposes only. This drawing is not for construction. A qualified Engineer must be retained to provide the Final Design prior to construction.
4. Structures such as handrails, guardrails, fences, terraces, and site conditions such as water applications, drainage and soil conditions, additional live and dead loads, etc., have significant effects on the wall design and have not been taken into account in this typical section. When accounted for in the Final Design, other conditions and elements may result in additional design measures (geogrid, drainage, etc) and cost.
5. For geogrid reinforced structures, a minimum Long Term Allowable Design Strength of 14 kN/m was assumed.
Contact your manufacturer or Risi Stone Systems for a list of approved geogrid reinforcements.

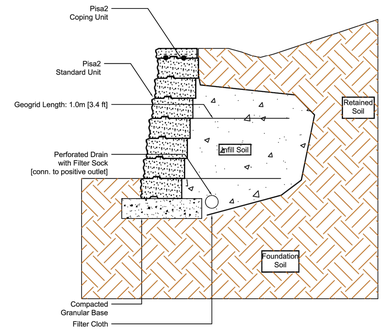
RisiStone retaining wall systems
www.risistone.com
1-800-626-9255

Pisa 2 ®
Retaining Wall
Geogrid Section
990mm (3.25ft)
Site: 3H:1V Slope - Clays
Infill: Granular
P21RBSAI099

2.5' HIGH WALL SECTION

NOT TO SCALE

TYPICAL SECTION - NOT FOR CONSTRUCTION



Design Specific Geometric Information

Retaining Wall System	Pisa2 w/ Geogrid	Geogrid Type and Manufacturer	See Notes
Maximum Height mm (in)	1140 (44)	Minimum Geogrid LTDS kN/m (lb/ft)	See Notes
Maximum Slope Above Wall	1V:3H	Maximum Slope Below Wall	None
Max. Surcharge Above Wall kPa (lb/sq.ft)	None	Depth of Embedment mm (in)	153 (6)
Batter of Wall	7.12 °	Compacted Base Dimension mm (in)	610 x 153 (24 x 6)

Design Specific Soil Information

	Soil Region				
	Infill	Retained	Foundation	Base	Drainage
Description (by USCS)	GW Well graded, free draining Granular	CL Inorganic Clays Low Plasticity	CL Inorganic Clays Low Plasticity	GW Well graded, free draining Granular	see infill
Effective Internal Friction Angle	35	28	28	39	NR
Moist Unit Weight kN/cu.m (lb/cu.ft)	22 (140)	20 (127)	20 (127)	22 (140)	NR
Effective Cohesion kPa (lb/sq.ft)	NR	NR	NR	NR	NR
Soil Notes	Placed in 150mm (6") lifts and compacted to 95 % SPD.	Undisturbed dense soil or well compacted Eng. fill.	Allowable bearing cap.must exceed 50kPa (1050 psf).	Crushed Gravel (free draining) compacted to 98 % SPD.	Gravel infill must be well graded, angular, free drain w/max. 8% fines

NR - Not Required
Notes:
1. This design meets or exceeds the minimum factors of safety required by Risi Stone Systems based on the design parameters listed above. The analysis was performed as outlined in the National Concrete Masonry Association Design Manual for Segmental Retaining Walls, Third Edition. This is a typical, non site-specific Design.
2. No analysis of global stability, total or differential settlement, or seismic effects has been performed.
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5. For geogrid reinforced structures, a minimum Long Term Allowable Design Strength of 14 kN/m was assumed.
Contact your manufacturer or Risi Stone Systems for a list of approved geogrid reinforcements.

RisiStone retaining wall systems
www.risistone.com
1-800-626-9255

Pisa 2 ®
Retaining Wall
Geogrid Section
1140mm (3.74ft)
Site: 3H:1V Slope - Clays
Infill: Granular
P21RBSAI114

3.0' HIGH WALL SECTION

NOT TO SCALE

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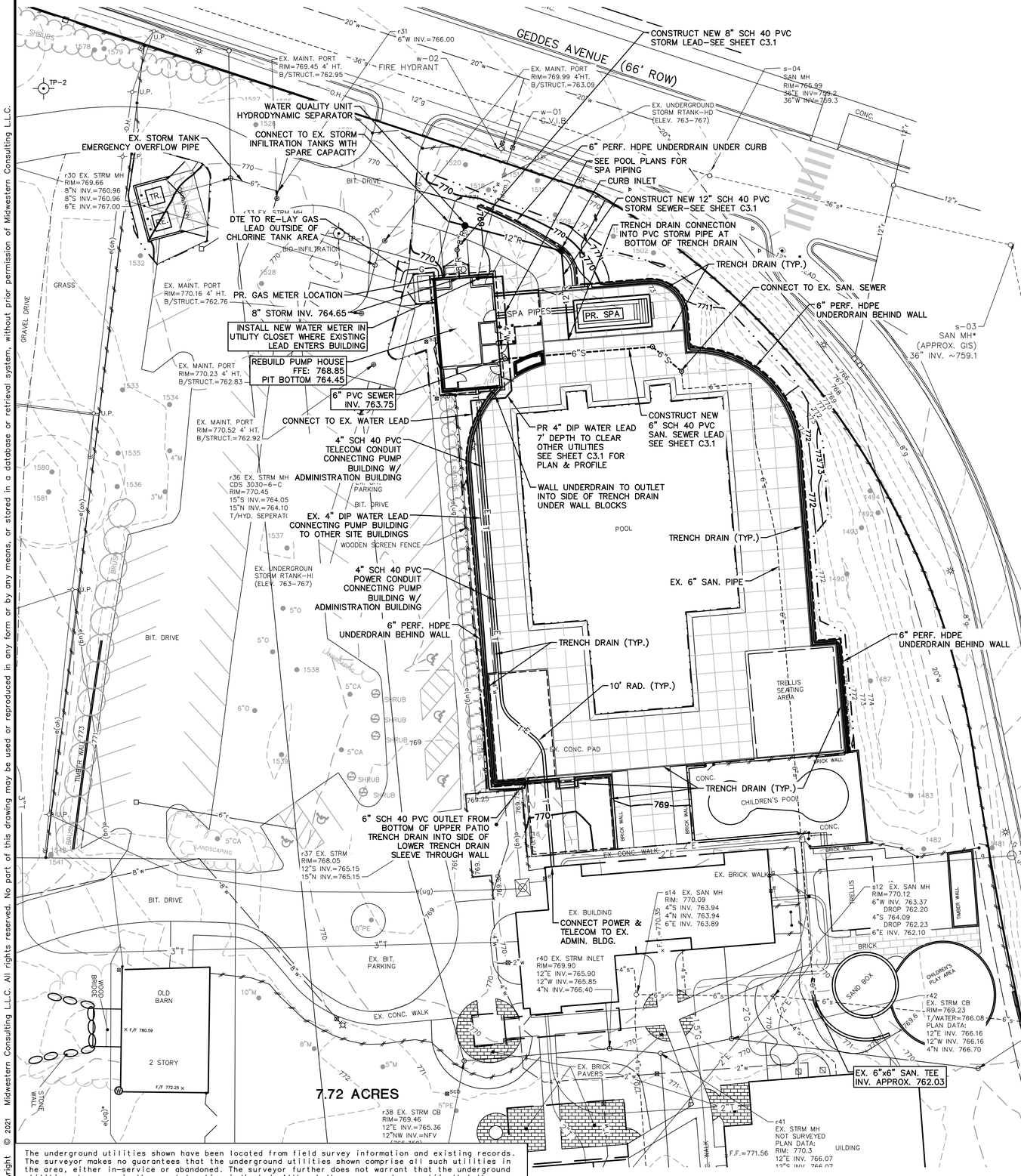
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
RETAINING WALL DETAILS

C2.8

JOB No. 20213

ISSUED:	REV. DATE
CITY SUBMITTAL 1	06-25-21
CITY SUBMITTAL 2	07-09-21

DATE: 7/7/2021
SHEET 12 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
20213RW1.dwg



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

NOTES:

1. ALL PRIVATE WATER MAIN AND LEADS ON THIS SITE ARE DOMESTIC LEADS. NO BUILDINGS HAVE EXISTING OR PROPOSED FIRE SERVICES. A SINGLE METER PIT EXISTS SOUTH OF GEDDES AVENUE, AND EACH BUILDING HAS ITS OWN BACKFLOW PREVENTOR AT THE PIPE ENTRY POINT. HIS METER PIT IS BEING REPLACED WITH A METER ROOM IN THE NEW PUMP BUILDING AS A PART OF THE CONSTRUCTION PROCESS. ENSURE THAT WATER SERVICE TO THE REMAINDER OF THE SITE IS MAINTAINED THROUGHOUT CONSTRUCTION. EXTERIOR WATER LEAD PIPING SHALL BE CLASS 50 DUCTILE IRON PIPE WITH POLYWRAP, PER THE CITY OF ANN ARBOR STANDARD SPECIFICATIONS.

2. ALL SANITARY AND STORM SEWERS ON SITE ARE PRIVATE SEWERS. SANITARY SEWER PIPES AND STORM PIPES SMALLER THAN 12 INCHES SHALL BE SDR 35 PVC. STORM PIPES 12 INCHES OR GREATER SHALL BE N12 HDPE.

3. THE EXISTING AND PROPOSED PUMP HOUSE BUILDINGS DO NOT HAVE ANY FOOTING DRAINS.

4. NO FIRE WALLS ARE EXISTING OR PROPOSED FOR THIS SITE.

5. ELECTRIC SERVICES ENTER THE SITE AND ARE METERED AT AND DISTRIBUTED FROM THE MAIN ADMINISTRATION / LOCKER ROOM BUILDING. COORDINATE ALL NEW CONNECTIONS AT THE MODIFIED METER/DISTRIBUTION AREA. SEE ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING PLANS FOR FURTHER INFORMATION.

6. INSTALL POWER AND TELECOM CONDUITS IN SCHEDULE 40 PVC PIPE, WITH 3' COVER. CONDUITS AND HANDHOLES TO BE CONSTRUCTED IN ACCORDANCE WITH THE 2012 MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION. SEE ELECTRICAL PLANS FOR WIRE AND CIRCUIT INFORMATION. INSTALL PULL WIRE WITH ALL CONDUITS.

7. COORDINATE THE GAS LEAD AND METER RELOCATION WITH DTE ENERGY.

8. ALL POWER, TELECOM, AND GAS PIPING CONDUITS TO BE BURIED 3' DEEP, OR DEEPER AS REQUIRED TO CROSS GAS AND OTHER UTILITIES. PARALLEL CONDUITS AND PIPES OF THE SAME UTILITY SHALL BE LAID 12" APART.

9. SEE THE POOL DESIGN DRAWINGS FOR ALL INFORMATION REGARDING PIPING AND EQUIPMENT FOR THE POOL AND SPA.

10. THE EXISTING RACQUET CLUB WATER LEAD IS TAPPED OFF OF THE HYDRANT LEAD ON GEDDES AVENUE, WHICH DOES NOT MEET CURRENT STANDARDS. THE CITY'S ENGINEERING DEPARTMENT IS ALLOWING THIS TO REMAIN IN PLACE UNTIL SUCH TIME THAT THE LEAD REQUIRES REPAIR OR REPLACEMENT AT WHICH TIME THE LEAD MUST BE CONNECTED TO THE 20" LOOPED WATER MAIN IN GEDDES AVE.

11. NOTE ON POOL DECK DRAINAGE: THIS POOL IS DESIGNED FOLLOWING THE STATE OF MICHIGAN EGLE AND NPDES STANDARDS FOR OUTDOOR POOLS AND DECKS. THE POOL BACKWASH AND DRAINAGE ARE DECHLORINATED BEFORE BEING RELEASED TO THE STORM SYSTEM. WHILE THE POOL DECKS THEMSELVES DRAIN TO A SANITARY SEWER IN AN ENCLOSED POOL, THEY ARE RELEASED AS STORM DRAINAGE IN AN OUTDOOR POOL. THE AMOUNT OF POOL WATER THAT IS RELEASED IS AN EXTREMELY SMALL PORTION OF THE TOTAL RUNOFF (WHEN FACTORING IN RAINFALL), SO THE DECHLORINATION OF POOL DECK WATER IS NOT PRACTICAL, AND IT IS AN OVERALL CHLORINE LEVEL IS BELOW NPDES REQUIREMENTS. THE FOLLOWING CALCULATIONS ARE PROVIDED TO INDICATE THAT THE CHLORINE IMPACTS ARE SUBSTANTIALLY LESS THAN THAT FROM IRRIGATION OR POWER–WASHING USING TAP WATER, OR FIRE HYDRANT FLUSHING WITH TAP WATER AVERAGING 2 PPM OF CHLORINE.

SWIMMING POOLS SHOULD BE MAINTAINED WITHIN 1.0–5.0 PPM OF CHLORINE, AND THE RACQUET CLUB KEEPS THE POOL WITHIN THE 2.0–2.5 PPM RANGE. THIS COMPARES FAVORABLY WITH CITY OF ANN ARBOR TAP WATER RANGING FROM 1.0–3.5 PPM IN THE 2020 WATER QUALITY REPORT. FOR COMPARISON, THE EPA ALLOWS DRINKING WATER CHLORINE LEVELS TO BE AS HIGH AS 4.5 PPM, AND THE NPDES DISCHARGE PERMIT FOR THE POOL WATER REQUIRES THE CHLORINE LEVELS TO BE REDUCED TO LESS THAN 0.5 PPM.

ASSUMED DECK DRAINAGE WATER: MOST POOL SPLASH WATER EVAPORATES ON THE DECK OR WITHIN THE TRENCH DRAINS. CONSERVATIVELY WE CAN ASSUME 5 GALLONS OF RUNOFF PER HOUR DURING INTENSE TEAM BUTTERFLY AND DIVING PRACTICE, OVER TEN HOURS, FOR A TOTAL OF 50 GALLONS PER DAY, OR 1,500 GALLONS PER MONTH. SOUTHEAST MICHIGAN GENERALLY RECEIVES ABOUT 3 INCHES OF RAIN PER MONTH, WHICH WOULD EQUATE TO 0.25 FT x 10,100 SFT = 2,525 CFT = 18,887 GALLONS OF RAINFALL, OR 20,387 TOTAL GALLONS. THUS THE POOL WATER IS ONLY 7.3% OF THE TOTAL RUNOFF, AND DECHLORINATING IS NOT PRACTICAL, AS THE INFRASTRUCTURE DESIGNED TO HANDLE AN INTENSE RAINFALL IS INCOMPATIBLE WITH THE DECHLORINATION INFRASTRUCTURE REQUIRING A SLOW AND STEADY FLOW RATE. LIKEWISE DRAINING THE POOL DECK INTO THE SANITARY SEWER IS NOT ALLOWED BY CITY CODE, AS IT WOULD OVERLOAD THE SANITARY SEWER SYSTEM AND CONTRIBUTE TO COMBINED SEWER OVERFLOWS.

USING A CONSERVATIVELY HIGH VALUE OF 5.0 PPM CHLORINE IN THE POOL WATER (THE LEGAL MAXIMUM, DOUBLE THE LEVEL PLANNED BY RACQUET CLUB MANAGEMENT), WITH 50 GALLONS PER DAY OF POOL WATER DISCHARGE ON THE DECK AND 3 INCHES OF RAINFALL FOR THE MONTH, WE GET 1,500 GALONS/20,387 GALLONS x 5.0 PPM = 0.37 PPM CHLORINE IN THE DISCHARGE. WITH POOL WATER MAINTAINED AT THE TARGET LEVEL OF 2.5 PPM, THIS WOULD REDUCE TO 0.18 PPM, AND GIVEN THE NATURE OF POOL DECK WATER MOSTLY EVAPORATING BEFORE REACHING A DRAIN, THIS VALUE WOULD BE EVEN LESS. THUS EVEN IN A MONTH WITH CHLORINE MAINTAINED AT THE MAXIMUM ALLOWABLE LEVEL, THE NPDES REQUIREMENT OF 0.50 PPM MAXIMUM CHLORINE DISCHARGE WOULD BE MET.

FINALLY, THE NATURE OF THE STORMWATER SYSTEM ON THIS PROPERTY WILL INFILTRATE THESE DRY–WEATHER DISCHARGES INTO THE GROUND, IN MUCH THE SAME WAY AS A SEPTIC SYSTEM DOES. THE DRAINAGE WILL NOT BE RELEASED INTO SURFACE WATERS, AND WILL DECHLORINATE NATURALLY UNDERGROUND AS IT REACHES UNDERGROUND AQUIFERS.

THIS REPRESENTS STANDARD PRACTICE FOR OUTDOOR POOL DECKS, AND IS APPROVED BY THE STATE OF MICHIGAN – EGLE IN THEIR PERMITS.

SCALE: 1" = 20'

0 20 40 60

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

LEGEND

772	EXIST. CONTOUR
772	PROP. CONTOUR
U.P.	EXIST. UTILITY POLE
	GUY WIRE
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
	EXIST. HYDRANT
	EXIST. GATE VALVE IN BOX
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
s	EXIST. SANITARY SEWER
	SIGN
g	GAS METER
	POST
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
TP–1	EXIST. TEST PIT LOCATION
	CONTROL PT.
T	PROP. TELEPHONE LINE
E	PROP. ELECTRIC LINE
R	PROP. STORM SEWER
	PROP. CATCH BASIN OR INLET
W	PROP. WATER MAIN
S	PROP. SANITARY SEWER
	PROP. CLEANOUT

SANITARY SEWER MITIGATION CALCULATIONS:

SWIMMING POOL:
EXISTING BACKWASH PEAK FLOW TO SANITARY SEWER: 600 GPM PROPOSED BACKWASH TO BE TREATED AND RELEASED TO STORM SEWER.
600 GPM PEAK FLOW REDUCTION TO SANITARY SEWER.

NEW SPA:
ALL BACKWASH AND DRAINAGE TO BE TREATED AND RELEASED TO THE STORM SEWER.
0 GPM

BUILDING RECONSTRUCTION:
THIS BUILDING WILL HAVE A SINGLE–OCCUPANCY BATHROOM, AND WILL CALCULATE THE SANITARY FLOWS USING THE SPA/COUNTRY CLUB VALUES FROM THE CITY'S TABLE A:

935 SFT x 0.30 GPD/SFT = 280.5 GPD
PEAK FLOW = 280.5 GPD x 4 [PEAKING FACTOR] x 1.1 [SYSTEM RECOVERY FACTOR] = 1,234.2 GPD
1,234.2 GPD x 1 DAY/24HR x 1 HR/60 MIN = 0.857 GPM

CHANGE RESULTING FROM PROJECT:
–600 GPM + 0.857 GPM = –599.143 GPM
ROUND TO A 599 GPM DECREASE.

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RACQUET CLUB OF ANN ARBOR

PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
UTILITY PLAN

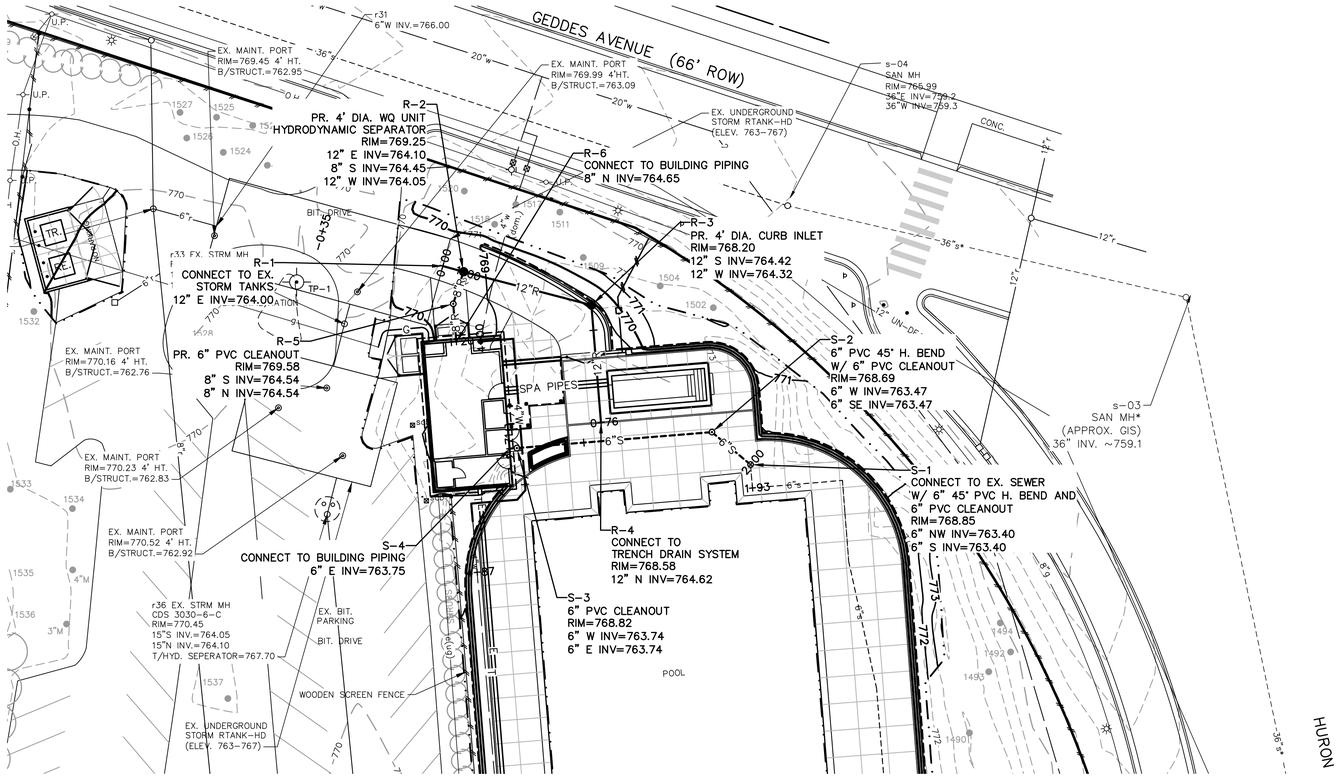
C3.0

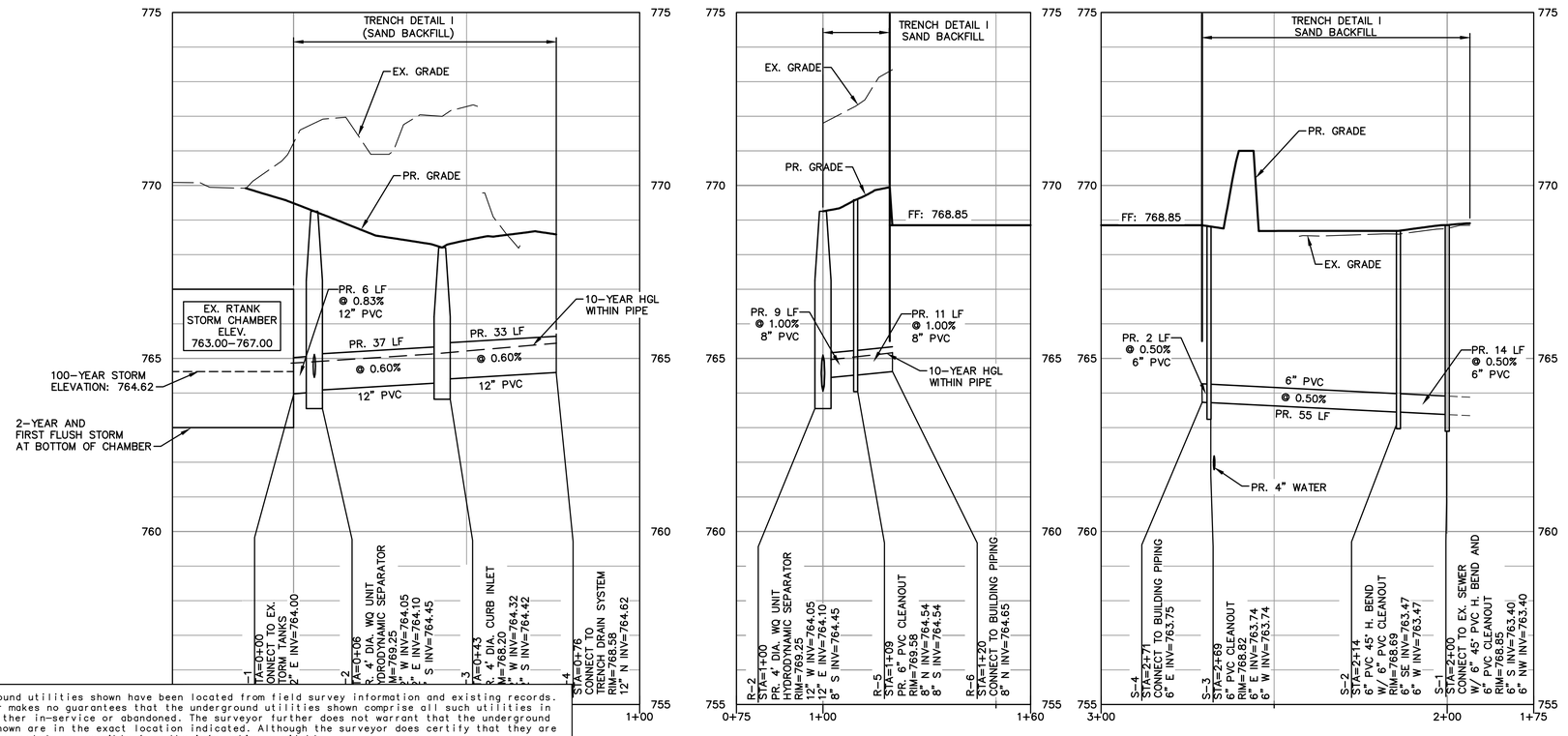
DATE: 7/8/2021
SHEET 13 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
20213UP1.dwg

JOB No. 20213

ISSUED:

REV.	DATE
CITY SUBMITTAL 1	07–09–21
CITY SUBMITTAL 2	





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SCALE: 1" = 20'

0 20 40 60

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

LEGEND

- EXIST. CONTOUR
- PROP. CONTOUR
- EXIST. UTILITY POLE
- GUY WIRE
- EXIST. OVERHEAD UTILITY LINE
- EXIST. LIGHT POLE
- EXIST. GAS LINE
- EXIST. WATER MAIN
- EXIST. HYDRANT
- EXIST. GATE VALVE IN BOX
- EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- EXIST. SANITARY SEWER
- SIGN
- GAS METER
- POST
- FENCE
- SINGLE TREE
- TREE OR BRUSH LIMIT
- EXIST. TEST PIT LOCATION
- CONTROL PT.
- PROP. TELEPHONE LINE
- PROP. ELECTRIC LINE
- PROP. STORM SEWER
- PROP. CATCH BASIN OR INLET
- PROP. WATER MAIN
- PROP. SANITARY SEWER
- PROP. CLEANOUT

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BRENT SCHOMAKER
734-216-0579

RACQUET CLUB OF ANN ARBOR

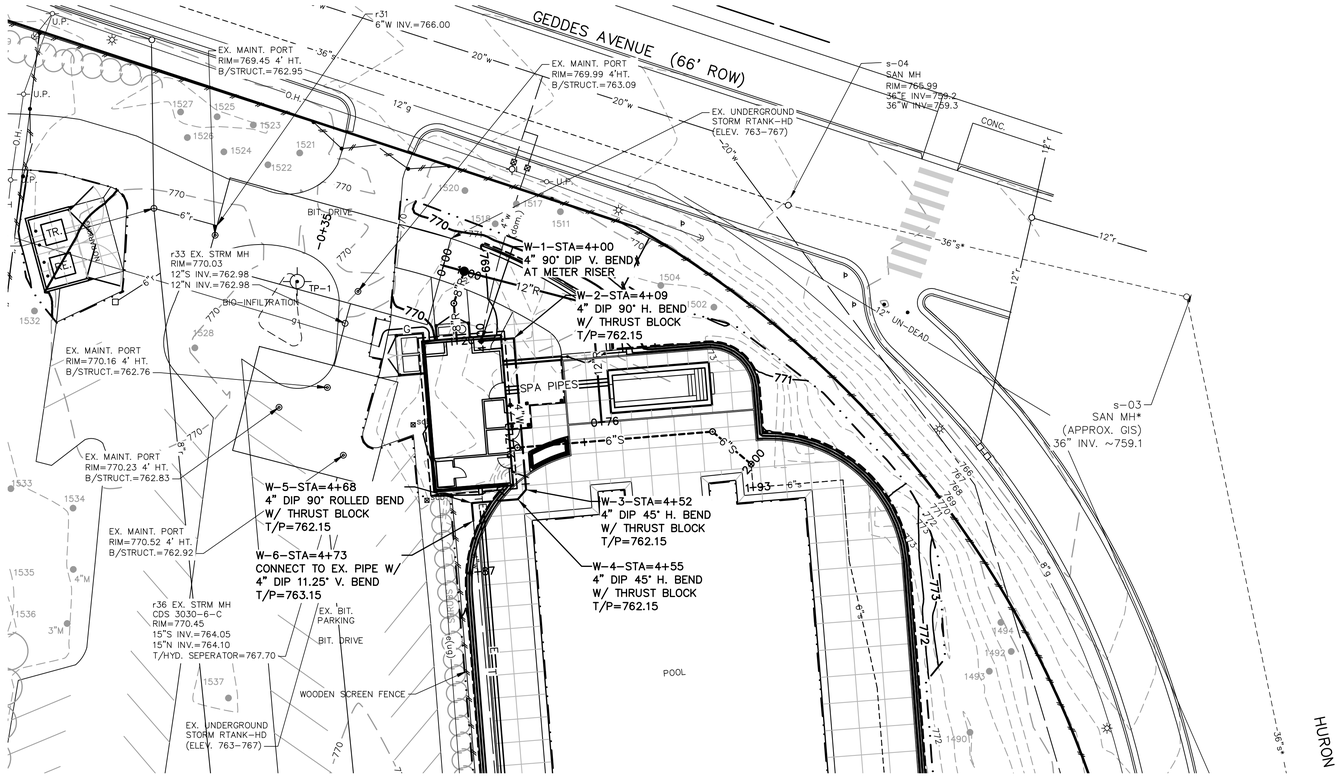
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
STORM & SANITARY PLAN & PROFILES

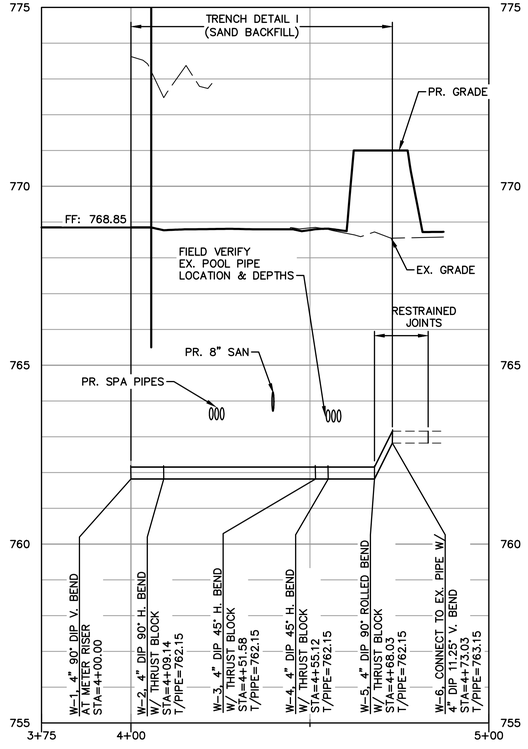
C3.1

JOB No. 20213

ISSUED:	REV. DATE
CITY SUBMITTAL 1	06-23-21
CITY SUBMITTAL 2	07-09-21

DATE: 7/7/2021
SHEET 14 OF 25
CADD: JBB
ENG: JAM
PM: ROW
TECH:
20213UP2.dwg





SCALE: 1" = 20'

0 20 40 60

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

LEGEND

772	EXIST. CONTOUR
772	PROP. CONTOUR
U.P.	EXIST. UTILITY POLE
	GUY WIRE
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
g	EXIST. GAS LINE
w	EXIST. WATER MAIN
	EXIST. HYDRANT
	EXIST. GATE VALVE IN BOX
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
s	EXIST. SANITARY SEWER
	SIGN
	GAS METER
	POST
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
TP-1	EXIST. TEST PIT LOCATION
	CONTROL PT.
T	PROP. TELEPHONE LINE
E	PROP. ELECTRIC LINE
R	PROP. STORM SEWER
	PROP. CATCH BASIN OR INLET
W	PROP. WATER MAIN
S	PROP. SANITARY SEWER
	PROP. CLEANOUT

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

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RACQUET CLUB OF ANN ARBOR

PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
WATER LEAD PLAN & PROFILE

C3.2

JOB No. 20213

ISSUED:	REV. DATE
CITY SUBMITTAL 1	06-07-21
CITY SUBMITTAL 2	07-09-21

DATE: 7/7/2021
SHEET 15 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
20213UP3.dwg

Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method

Racquet Club of Ann Arbor
Ann Arbor, MI
WQU

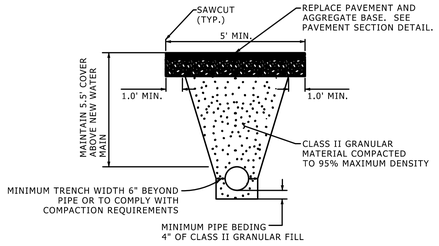
CONTECH ENGINEERED SOLUTIONS

GDS

AREA (acres): 1.5 **CDS MODEL: 2015-4**
WEIGHTED C: 0.67 **PARTICLE SIZE (µm): 110**
Tc (minutes): 15

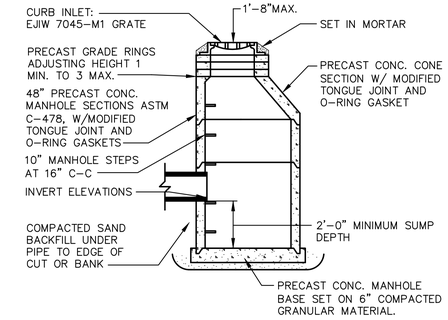
Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Removal Efficiency (%)	Incremental Removal (%)
0.02	13.13%	13.1%	0.02	100.00	13.13
0.04	11.36%	24.5%	0.04	100.00	11.36
0.06	10.08%	34.6%	0.06	99.33	10.01
0.08	7.49%	42.1%	0.08	98.65	7.39
0.10	7.01%	49.1%	0.10	97.97	6.87
0.12	5.37%	54.4%	0.12	97.29	5.22
0.14	4.73%	59.2%	0.14	96.61	4.57
0.16	4.13%	63.3%	0.16	95.92	3.96
0.18	3.53%	66.8%	0.18	95.24	3.36
0.20	2.99%	69.8%	0.20	94.56	2.83
0.25	5.50%	75.3%	0.25	92.85	5.11
0.30	4.47%	79.8%	0.30	91.15	4.07
0.35	3.85%	83.6%	0.35	89.44	3.44
0.40	2.16%	85.8%	0.40	87.7	1.9
0.45	2.09%	87.9%	0.45	86.0	1.8
0.50	1.31%	89.2%	0.50	84.3	1.1
0.75	5.07%	94.3%	0.75	72.1	3.7
1.00	2.58%	96.9%	1.01	54.1	1.4
1.50	2.50%	99.4%	1.51	36.0	0.9
2.00	0.51%	99.9%	2.01	27.0	0.1
2.54	0.15%	100.0%	2.55	21.3	0.0
					92.25
			Predicted % Annual Rainfall Treated =		97.1%
			Predicted Net Annual Load Removal Efficiency =		**92.2%**

1 - Based on Rainfall Data from DETROIT CITY AP Station

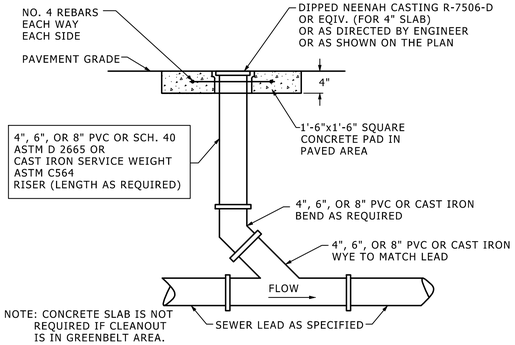


NOTE:
1) TRENCH DETAILS SHOW TYPE OF BACKFILL AND SURFACE RESTORATION ONLY.
2) TRENCHING TO CONFORM TO ALL APPLICABLE M.I.O.S.H.A. STANDARDS.
3) DENSITY TESTING PER CITY SPECIFICATIONS.

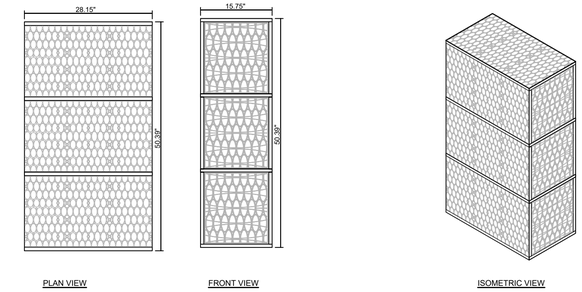
TRENCH BACKFILL UNDER PAVEMENT
(CITY OF ANN ARBOR TRENCH DETAIL I)
NO SCALE



4' DIA. CATCH BASIN
NOT TO SCALE



SANITARY & STORM SEWER LEAD CLEANOUT
NO SCALE



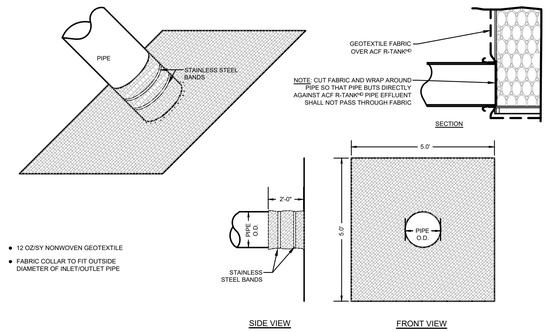
MODULE DATA

GEOMETRY: LENGTH = 28.15 IN. (715 MM)
WIDTH = 15.75 IN. (400 MM)
HEIGHT = 50.39 IN. (1280 MM)
STORAGE VOLUME = 12.28 CF (348 L)
VOID INTERNAL VOLUME: 95%
VOID SURFACE AREA: 90%

LOAD RATING: 40 PSI, (MODULE ONLY)
HS25, (WITH ACF COVER SYSTEM)

MATERIAL: 85% RECYCLED POLYPROPYLENE

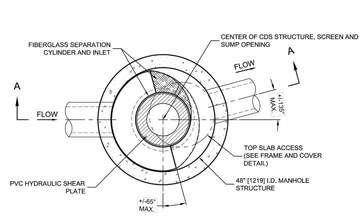
EXISTING RTANK DATA FOR REFERENCE
NO SCALE



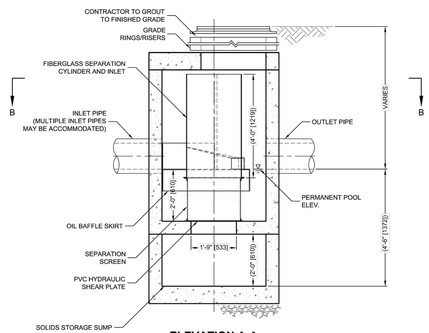
- 12 OZ/SY NONWOVEN GEOTEXTILE
- FABRIC COLLAR TO FIT OUTSIDE DIAMETER OF INLET/OUTLET PIPE

CONNECTION DETAIL TO EXISTING RTANK STORM CHAMBER
NO SCALE

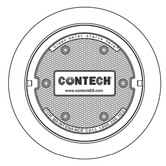
CDS2015-4-C DESIGN NOTES
THE STANDARD CDS2015-4-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.
CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST	WIDTH	HEIGHT	
	*	*	
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO H520 AND CASTINGS SHALL MEET H520 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

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 CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

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

CDS2015-4-C
INLINE CDS
STANDARD DETAIL

Project: Racquet Club of Ann Arbor
Location: *Ann Arbor, MI*
Prepared For: Midwestern Consulting

CONTECH ENGINEERED SOLUTIONS

Purpose: To calculate the first flush runoff flow rate (WQF) over a given site area. In this situation the WQV to be analyzed is the runoff produced by the first 1" of rainfall.

Reference:
United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Given:

Structure Name	A (acres)	A (miles²)	Runoff Coefficient	Percent Imp. (%)*	t_c (min)	t_c (hr)
WQU	1.50	0.00234	0.67	61.67	15.0	0.250

* Assumes runoff coefficient of 0.3 for pervious areas and 0.9 for impervious areas.

Procedure:
The Water Quality Flow (WQF) is calculated using the Water Quality Volume (WQV). This WQV, converted to watershed inches, is substituted for the runoff depth (Q) in the Natural Resources Conservation Service (formerly Soil Conservation Service), TR-55 Gr

1. Compute WQV in watershed inches using the following equation:

WQV = P * R

where: WQV = water quality volume (watershed inches)
P = design precipitation (inches)
R = volumetric runoff coefficient = 0.05 + 0.009(I)
I = percent impervious cover

Structure Name	Percent Imp. (%)	R	P (in)	WQV (in)	WQV (CF)
WQU	61.67	0.605	1	0.605	3,294.23
					-
					-

2. Compute the NRCS Runoff Curve Number (CN) using the following equation, or graphically using Figure 2-1 from TR-55 (USDA, 1986):

CN = 1000 / [10+5P+10Q-10(Q^2+1.25QP)$^{1/2}$]

where: CN = Runoff Curve Number
P = design precipitation (inches)
Q = runoff depth (watershed inches)

Structure Name	Q (in)	
WQU	0.605	95.64

3. Using computed CN, read initial abstraction (I_a) from Table 4-1 in Chapter 4 of TR-55; compute I_a/P, interpolating when appropriate.

Structure Name	I_a (in)	I_a/P
WQU	0.083	0.083

4. Compute the time of concentration (t_c) in hours and the drainage area in square miles. A minimum t_c of 0.167 hours (10 minutes) should be used.

Structure Name	t_c (hr)	A (miles²)
WQU	0.250	0.00234

5. Read the unit peak discharge (q_u) from Exhibit 4-II in Chapter 4 of TR-55 for appropriate t_c for type II rainfall distribution.

Structure Name	t_c (hr)	I_a/P	q_u (csm/in)
WQU	0.250	0.083	731

6. Substituting WQV (watershed inches) for runoff depth (Q), compute the water quality flow (WQF) from the following equation:

WQF = (q_u)*(A)*(Q)

where: WQF = water quality flow (cfs)
q_u = unit peak discharge (cfs/mi²/inch)
A = drainage area (mi²)
Q = runoff depth (watershed inches)

Structure Name	q_u (csm/in)	A (miles²)	Q (in)	WQF (cfs)
WQU	731	0.00234	0.605	1.04

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RACQUET CLUB OF ANN ARBOR
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
UTILITY DETAILS

C3.3

DATE: 7/7/2021
SHEET 16 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
2021\3012.dwg

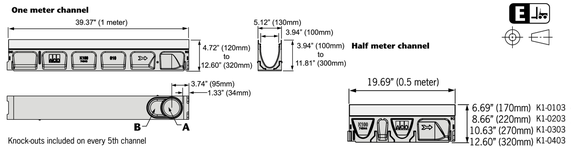
ISSUED:	REV. DATE
CITY SUBMITTAL 1	05-07-21
CITY SUBMITTAL 2	07-09-21

JOB No. 20213

ACO DRAIN

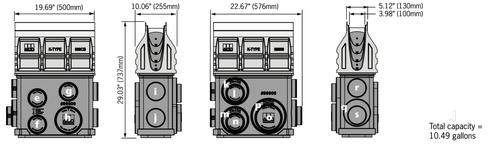
KlassikDrain - K100 Galvanized steel edge rail channel system

One meter channel



Knock-outs included on every 5th channel

Type K901G In-line catch basin



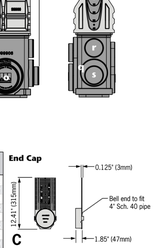
Total capacity = 10.49 gallons

Outlet flow rates

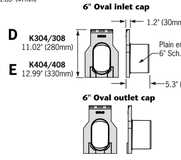
Outlet	Product	Outlet size (Sch. 40)	Invert Depth	GPM	CFS
a	Bottom outlet - K00	4" round	3.94"	108	0.24
a	Bottom outlet - K40	4" round	11.81"	187	0.42
b	Bottom outlet - K00	6" oval	3.94"	177	0.39
b	Bottom outlet - K40	6" oval	11.81"	306	0.68
c	End outlet - K20	4" round	7.87"	132	0.29
c	End outlet - K40	4" round	11.81"	171	0.38
d	K1-308-6 6" outlet cap	6" oval	9.84"	233	0.52
d	K1-408-6 6" outlet cap	6" oval	11.81"	264	0.59
e	Type K1-901G	4" round	20.68"	235	0.52
f	Type K1-901G	4" round	27.17"	226	0.50
g	Type K1-901G	4" round	18.99"	265	0.59
h	Type K1-901G	6" round	27.17"	263	0.59
i	Type K1-901G	4" round	19.30"	222	0.49
j	Type K1-901G	4" round	25.67"	586	1.30
k	Type K1-901G	6" round	19.99"	269	0.60
l	Type K1-901G	4" round	19.36"	227	0.51
m	Type K1-901G	6" round	27.30"	604	1.35
n	Type K1-901G	4" round	26.43"	505	1.12
o	Type K1-901G	6" round	26.43"	593	1.32
p	Type K1-901G	8" round	27.30"	1051	2.34
q	Type K1-901G	6" round	25.85"	273	0.61
r	Type K1-901G	4" round	18.56"	235	0.52
s	Type K1-901G	4" round	25.30"	224	0.50

Note: These are the pipe flow rates at the specified outlet, **NOT** channel flow rates. Catch basin flow rates are without trash bucket - using trash bucket reduces flow.

End Cap



6" Oval inlet cap



6" Oval outlet cap

February 2019

www.acousa.com

ACO Specification Information

ACO DRAIN

KlassikDrain - K100 Galvanized steel edge rail channel system

Description	Part No.	Invert Inches[2]	Invert mm[2]	Weight Lbs.
K1-00 Neutral channel - 39.37" (1m)[3]	**74041**	**3.94**	**100**	**28.1**
K1-1 Sloped channel - 39.37" (1m)	**74001**	4.13	105	28.1
K1-2 Sloped channel - 39.37" (1m)	**74002**	4.33	110	28.9
K1-3 Sloped channel - 39.37" (1m)	**74003**	4.53	115	29.7
K1-4 Sloped channel - 39.37" (1m)	**74004**	4.72	120	30.5
K1-5 Sloped channel - 39.37" (1m)[4]	**74005**	4.92	125	31.3
K1-6 Sloped channel - 39.37" (1m)	**74006**	5.12	130	32.1
K1-7 Sloped channel - 39.37" (1m)	**74007**	5.31	135	32.9
K1-8 Sloped channel - 39.37" (1m)	**74008**	5.51	140	33.7
K1-9 Sloped channel - 39.37" (1m)	**74009**	5.71	145	34.5
K1-10 Sloped channel - 39.37" (1m)[5]	**74010**	5.91	150	35.3
K1-010 Neutral channel - 39.37" (1m)[3]	**74043**	**5.91**	**150**	**35.3**
K1-0103 Neutral channel - 19.69" (0.5m)[3]	**74044**	**5.91**	**150**	**17.0**
K1-11 Sloped channel - 39.37" (1m)	**74011**	6.10	155	36.1
K1-12 Sloped channel - 39.37" (1m)	**74012**	6.30	160	36.9
K1-13 Sloped channel - 39.37" (1m)	**74013**	6.50	165	37.7
K1-14 Sloped channel - 39.37" (1m)	**74014**	6.69	170	38.5
K1-15 Sloped channel - 39.37" (1m)[5]	**74015**	6.89	175	39.3
K1-16 Sloped channel - 39.37" (1m)	**74016**	7.09	180	40.1
K1-17 Sloped channel - 39.37" (1m)	**74017**	7.28	185	40.9
K1-18 Sloped channel - 39.37" (1m)	**74018**	7.48	190	41.7
K1-19 Sloped channel - 39.37" (1m)	**74019**	7.68	195	42.5
K1-20 Sloped channel - 39.37" (1m)[5]	**74020**	7.87	200	43.4
K1-020 Neutral channel - 39.37" (1m)[3]	**74045**	**7.87**	**200**	**43.4**
K1-0203 Neutral channel - 19.69" (0.5m)[3]	**74046**	**7.87**	**200**	**20.5**
K1-21 Sloped channel - 39.37" (1m)	**74021**	8.07	205	44.2
K1-22 Sloped channel - 39.37" (1m)	**74022**	8.27	210	45.0
K1-23 Sloped channel - 39.37" (1m)	**74023**	8.46	215	45.8
K1-24 Sloped channel - 39.37" (1m)	**74024**	8.66	220	46.6
K1-25 Sloped channel - 39.37" (1m)[5]	**74025**	8.86	225	47.4
K1-26 Sloped channel - 39.37" (1m)	**74026**	9.06	230	48.2
K1-27 Sloped channel - 39.37" (1m)	**74027**	9.25	235	49.0
K1-28 Sloped channel - 39.37" (1m)	**74028**	9.45	240	49.8
K1-29 Sloped channel - 39.37" (1m)	**74029**	9.65	245	50.6
K1-30 Sloped channel - 39.37" (1m)[5]	**74030**	9.84	250	51.4
K1-030 Neutral channel - 39.37" (1m)[3]	**74047**	**9.84**	**250**	**51.4**
K1-0303 Neutral channel - 19.69" (0.5m)[3]	**74048**	**9.84**	**250**	**24.0**
K1-31 Sloped channel - 39.37" (1m)	**74031**	10.04	255	52.2
K1-32 Sloped channel - 39.37" (1m)	**74032**	10.24	260	53.0
K1-33 Sloped channel - 39.37" (1m)	**74033**	10.43	265	53.8
K1-34 Sloped channel - 39.37" (1m)	**74034**	10.63	270	54.6
K1-35 Sloped channel - 39.37" (1m)[5]	**74035**	10.83	275	55.4
K1-36 Sloped channel - 39.37" (1m)	**74036**	11.02	280	56.2
K1-37 Sloped channel - 39.37" (1m)	**74037**	11.22	285	57.0
K1-38 Sloped channel - 39.37" (1m)	**74038**	11.42	290	57.9
K1-39 Sloped channel - 39.37" (1m)	**74039**	11.61	295	58.7
K1-40 Sloped channel - 39.37" (1m)[5]	**74040**	11.81	300	59.5
K1-040 Neutral channel - 39.37" (1m)[3]	**74049**	**11.81**	**300**	**59.5**
K1-0403 Neutral channel - 19.69" (0.5m)[3]	**74050**	**11.81**	**300**	**27.5**
K1.901G Inline catch basin - 19.69" (0.5m)[3]	**94608**	28.81	701.9	52.6
K1-621G catch basin - 19.69" (0.5m)[3]	**94617**	28.84	732.5	55.8
K1-631G catch basin - 19.69" (0.5m)[3]	**94631**	40.84	1037.4	65.8
K1-Series 600 Optional plastic riser	**99902**	-	-	10.0
Foul air trap - fits both 900 & 600 series basins	**90854**	-	-	1.2
K1-3044-6 6" Inlet Cap	**96839**	9.84	250	5.2
K1-3084-6 6" Outlet Cap	**96840**	9.84	250	5.0
K1-4044-6 6" Inlet Cap	**96834**	11.81	300	6.0
K1-4084-6 6" Outlet Cap	**96836**	11.81	300	5.8
Universal end cap	**96822**	11.81	300	0.4
Debris strainer for 4" bottom knockout	**93488**	-	-	0.2
4" Oval to 6" round outlet adapter	**95140**	-	-	1.1
K1-Installation device	**97477**	-	-	2.8
Grate removal tool	**01318**	-	-	0.3
K1-QuickLok locking bar	**02899**	-	-	0.1

Notes:
1. This channel offers a bottom knockout feature; 4" round/6" oval.
2. Inverts shown are for the male end; for female invert depth subtract 5mm (~0.2") from the male invert (except for neutral channels, where it will be same as male invert).
   To calculate the overall channel depth add 20mm (~0.8") to invert depth.
3. This catch basin kit includes a polymer concrete top, removable Quicklok locking bar, trash bucket and plastic base. Select an appropriate grate.
4. This catch basin kit includes a polymer concrete top, removable Quicklok locking bar, deep trash bucket, plastic riser and plastic base. Select an appropriate grate.

Specifications

General
The surface drainage system shall be ACO Drain K100 complete with gratings secured with 'QuickLok' locking as manufactured by ACO, Inc. or approved equal.

Materials
The trench system bodies shall be manufactured from polyester polymer concrete with the minimum properties as follows:

Compressive strength:	14,000 psi
Flexural strength:	4,000 psi
Water absorption	0.07%
Frost proof	YES
Salt proof	YES
Dilute acid and alkali resistant	YES

The nominal clear opening shall be 4" (100mm) with overall width of 5.12" (130mm). Pre-cast units shall be manufactured with either an invert slope of 0.5% or with neutral invert and have a wall thickness of at least 0.50" (13mm). Each unit will feature a partial radius in the trench bottom and a male to female interconnecting end profile. Units shall have horizontal cast in anchoring keys on the outside wall to ensure maximum mechanical bond to the surrounding bedding material and pavement surface. The galvanized steel edge rail will be integrally cast in by the manufacturer to ensure maximum homogeneity between polymer concrete body and edge rail. Each edge rail shall be at least 3/32" (2.5mm) thick.

Grates
Grates shall be specified. See separate ACO Spec Info grate sheets for details. After removal of grates and 'QuickLok' bar there shall be uninterrupted access to the trench to aid maintenance.

Installation
The trench drain system shall be installed in accordance with the manufacturer's installation instructions and recommendations.

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SPEC INFO

February 2019

www.acousa.com

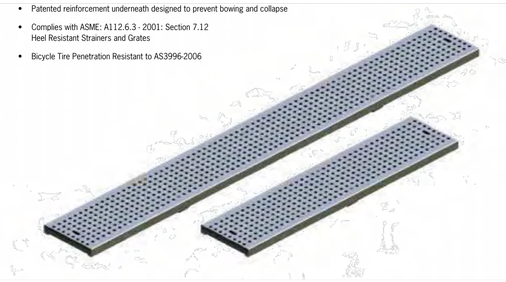
ACO Specification Information

ACO DRAIN

Type 465D/466D Perforated stainless steel grate (ADA)

Product Features

- Certified to EN 1433 Load Class C - 56,000 lbs - 1,162 psi
- Uses 'DrainLok' bottless locking system
- Suitable for use with K100, KS100, and H100K-8 channels
- Manufactured from 16 gauge, grade 304 stainless steel
- Complies with ADA - American Disabilities Act of 1990 Section 4.5.4
- Patented reinforcement underneath designed to prevent bowing and collapse
- Complies with ASME: A112.6.3 - 2001: Section 7.12 Heel Resistant Strainers and Grates
- Bicycle Tire Penetration Resistant to AS3996-2006



Specifications

General
The surface drainage system shall be ACO Drain K100, KS100, and H100K-8 channels*, complete with ACO Type 465D/466D Perforated stainless steel grate with 'DrainLok' locking as manufactured by ACO, Inc. or similar approved.

Materials
The covers shall be manufactured from stainless steel and have ***minimum*** properties as follows:

- ***Independently certified to meet Load Class C - 1,162 psi to EN 1433 - 56,000 lbs***
- ***16 gauge, grade 304 stainless steel***
- ***Intake area of 14.1 sq. in. (91.0 cm²) per half meter of grate***

The overall width of 4.84" (123mm) and overall length of 39.37" (1000mm) (Type 4650) and 19.69" (500mm) (Type 4660). Perforations measure 0.25" (6.35mm) in diameter.

Installation
The trench drain system and grates shall be installed in accordance with the manufacturer's installation instructions and recommendations.

* delete as appropriate

April 2018

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ACO DRAIN

Type 465D/466D Perforated stainless steel grate (ADA)

Plan view

Side elevation

Description	Part No.	Length inches (mm)	Width inches (mm)	Weight lbs.
DrainkLok grates				
Type 465D perforated stainless steel grate	**12654**	39.37 (1000)	4.84 (123)	11.3
Type 466D perforated stainless steel grate	**12655**	19.69 (500)	4.84 (123)	5.7

'DrainLok' locking mechanism

ACO DrainLok™ is a patented, boltless locking system that removes the need for bolts and bars and improves the hydraulic capacity of the channel. The DrainLok™ mechanism simply clips into the channel edge rail for rapid installation. ACO DrainLok™ grates are fitted with an anti-shunt mechanism that restricts unwanted grate movement when installed, improving durability and longevity of the system.

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SPEC INFO

April 2018

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ACO Specification Information

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

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RACQUET CLUB OF ANN ARBOR

PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
TRENCH DRAIN DETAILS

C3.4

DATE: 7/7/2021
SHEET 17 OF 25

REV.	DATE
1	07-09-21

CADD: JBB
ENG: JAM
PM: RCW
TECH:
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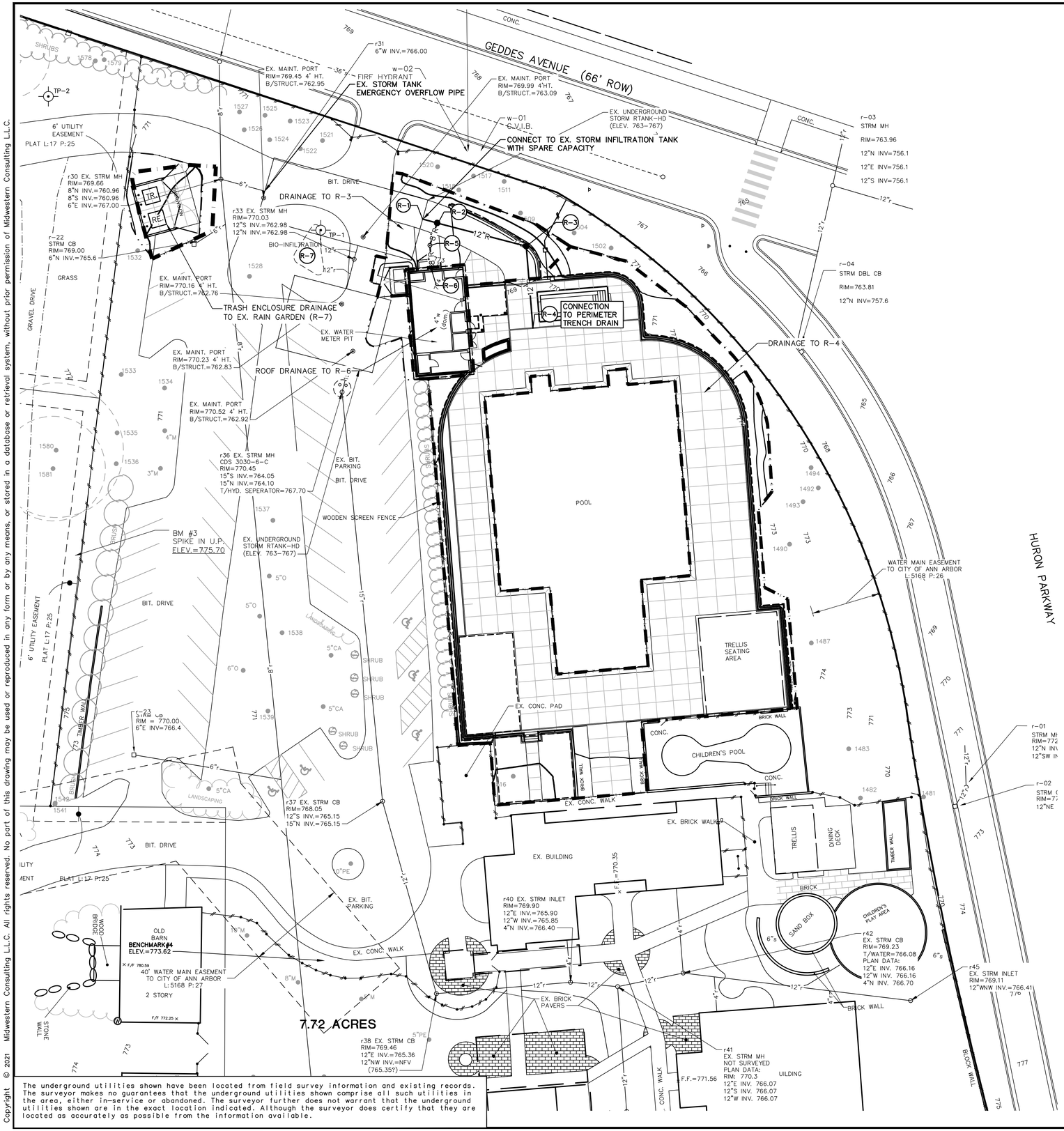
JOB No. 20213

ISSUED:
CITY SUBMITTAL 1
CITY SUBMITTAL 2



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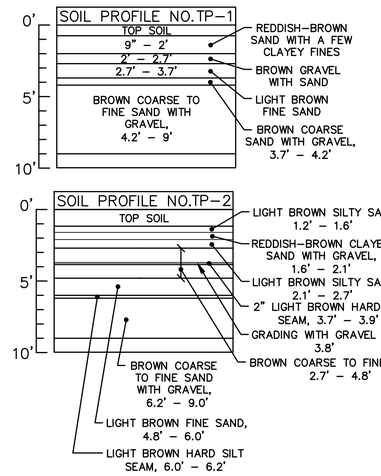

811 Know what's below. Call before you dig.

LEGEND

- EXIST. CONTOUR
- PROP. CONTOUR
- SIGN
- POST
- FENCE
- SINGLE TREE
- TREE OR BRUSH LIMIT
- EXIST. STORM SEWER
- PROP. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- PROP. CATCH BASIN OR INLET

Racquet Club - Pump House & Site Renovation
Midwestern Consulting Project # 20213
5/26/2021

Rational C Values:

Soil Type	Roof/Pvmt.	Vegetated	Water
A	**0.95**	**0.20**	**1.00**
B	0.95	0.30	1.00
C	0.95	0.35	1.00
D	0.95	0.50	1.00

The NRCS Soils Report indicates BnB - Boyer Loamy Sand throughout the project site, with Hydrologic Group B.
However excellent sandy soils were found in the soils investigation near the work zone, so Soil Type A is used, as in the 2016 project at the same site.

Inlet/Area #	sft total area	sft roof	sft pvmt.	sft water	total imp.	sft veg.	Soil Type	Veg. C	CxA (sft)	CxA (ac)	Area (ac)	C Value
R-1 (Storm Tank)	0	0	0	0	0	0	A	0.20	0	0.000	0.000	0.00
R-2 (Water Quality Manhole)	0	0	0	0	0	0	A	0.20	0	0.000	0.000	0.00
R-3 (Curb Inlet)	2,152	0	1,310	0	1,310	842	A	0.20	1,413	0.032	0.049	0.66
R-4 (Perimeter Trench Drain)	16,894	0	14,354	0	14,354	2,540	A	0.20	14,144	0.325	0.388	0.84
R-5 (Cleanout)	0	0	0	0	0	0	A	0.20	0	0.000	0.000	0.00
R-6 (Pump House Roof)	1,069	1,069	0	0	1,069	0	A	0.20	1,016	0.023	0.025	0.95
R-7 (Bio-Infiltration Rain Garden)	935	0	825	0	825	110	A	0.20	806	0.018	0.021	0.86
2016 Project Areas "A+C"	44,237	8,695	16,517	0	25,212	19,025	A	0.20	27,756	0.637	1.016	0.63
* The 2016 Project took Areas "A" and "C" into the storm chambers. See Sheets C8.0 and C8.1 (reprints from the 2016 stormwater calculations) for further information.												
TOTAL AREAS TO STORM TANKS	**65,287**	**9,764**	**33,006**	**0**	**42,770**	**22,517**	**A**	**0.20**	**45,135**	**1.036**	**1.499**	**0.69**

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PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
STORMWATER PLAN

C4.0

JOB No. 20213

ISSUED:	REV. DATE
CITY SUBMITTAL 1	07-09-21
CITY SUBMITTAL 2	

DATE: 7/7/2021
SHEET 18 OF 25
CADD: JRB
ENG: JAM
PM: ROW
TECH:
20213SWT.dwg

Underground Tank Stormwater Calculations

REV 5/26/2021

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

Rational Method Variables

Cover Type	Soil Type	Area (sft)	Area (ac)	Runoff Coeff. (C)	(C) x (Area)
Building		9,764	0.22	0.95	0.21
Pavement		33,006	0.76	0.95	0.72
Grass	A	22,517	0.52	0.15	0.08
Grass	B		0.00	0.25	0.00
Grass	C		0.00	0.30	0.00
Grass	D		0.00	0.45	0.00
Water Surface			0.00	1.00	0.00
Total		65,287	1.50		1.01
		Weighted C = (Sum(C)x(Area))/(Area Total)=			0.67

NRCS Variables (Pervious)

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) x (Area)
Grass	A	22,517	0.52	49	0.25
Grass	B	0	0.00	69	0.00
Grass	C	0	0.00	79	0.00
Grass	D	0	0.00	84	0.00
Total		22,517	0.52		0.25
		Weighted CN = (Sum(CN)x(Area))/(Area Total)=		49	

NCRS Variables (Impervious)

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) x (Area)
Building		9,764	0.22	98	0.22
Pavement		33,006	0.76	98	0.74
Water Surface		0	0.00	98	0.00
Total		42,770	0.98		0.96
		Weighted CN = (Sum(CN)x(Area))/(Area Total)=		98	

W2 - W2 - First Flush Runoff Calculations (Vff)

A. V_{ff} = 1" x 1'/12" x 43560 sft/ac x A x C where A= 1.50 and where C= 0.67

V_{ff} = 1" x 1'/12" x 43560 sft/ac x 1.50 x 0.67 = 3,645 cf

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

A. 2 year / 24 hour storm event: P= 2.35 in
B. Pre-Development CN (Good Cover Woods, Type A Soils) CN= 30
C. S = (1000 / CN) - 10 S= 23.333 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 0.000 in
E. Total Site Area excluding "Self-Crediting" BMPs 65,287 sft
F. $V_{bf\text{-}pre}$ = Q x (1/12) x Area $V_{bf\text{-}pre}$ = 0 cft

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

A. 2 year / 24 hour storm event: P= 2.35 in
B. Pervious Cover CN From Worksheet 1 CN= 49
C. S = (1000 / CN) - 10 S= 10.408 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 0.007 in
E. Pervious Cover Area from Worksheet 1 22,517 sft
F. $V_{bf\text{-}per\text{-}post}$ = Q x (1/12) x Area $V_{bf\text{-}per\text{-}post}$ = 13 cft

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

A. 2 year / 24 hour storm event: P= 2.35 in
B. Impervious Cover CN From Worksheet 1 CN= 98
C. S = (1000 / CN) - 10 S= 0.204 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 2.122 in
E. Impervious Cover Area from Worksheet 1 42,770 sft
F. $V_{bf\text{-}imp\text{-}post}$ = Q x (1/12) x Area $V_{bf\text{-}imp\text{-}post}$ = 7,562 cft

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

A. 100 year / 24 hour storm event: P= 5.11 in
B. Pervious Cover CN From Worksheet 1 CN= 49
C. S = (1000 / CN) - 10 S= 10.408 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 0.683 in
E. Pervious Cover Area from Worksheet 1 22,517 sft
F. $V_{100\text{-}per\text{-}post}$ = Q x (1/12) x Area $V_{100\text{-}per\text{-}post}$ = 1,281 cft

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

A. 2 year / 24 hour storm event: P= 5.11 in
B. Impervious Cover CN From Worksheet 1 CN= 98
C. S = (1000 / CN) - 10 S= 0.204 in
D. Q = [(P-0.2S)^2] / [P+0.8S] Q= 4.873 in
E. Impervious Cover Area from Worksheet 1 42,770 sft
F. $V_{bf\text{-}imp\text{-}post}$ = Q x (1/12) x Area $V_{bf\text{-}imp\text{-}post}$ = 17,368 cft

W8 - Time of Concentration (Tc-hrs)

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

W9 - Runoff Summary & On-Site Infiltration Requirement

A. Summary from Previous Worksheets

First Flush Volume (Vff)	**3,645 cft**
Pre-Development Bankfull Runoff Volume (Vbf-pre)	**0 cft**
Pervious Cover Post-Development Bankfull Volume (Vbf-per-post)	*13 cft*
Impervious Cover Post-Development Bankfull Volume (Vbf-imp-post)	*7,562 cft*
Total BF Volume (Vbf-post)	**7,575 cft**
Pervious Cover Post-Development 100-Year Volume (V100-per-post)	*1,281 cft*
Impervious Cover Post-Development 100-Year Volume (V100-imp-post)	*17,368 cft*
Total 100-Year Volume (V100)	**18,649 cft**

B. Determine Onsite Infiltration Requirement

Subtract the Pre-Development Bankfull from the Post-Development Bankfull Volume	
Total Post-Development Bankfull Volume (Vbf-post)	7,575 cft
Pre-Development Bankfull Runoff Volume (Vbf-pre)	0 cft
Bankfull Volume Difference	**7,575 cft**
Infiltration Requirement (Vinf)	**7,575 cft**

W10 - Detention/Retention Requirement

A. Q_P = 238.6 Tc^-0.82 743.63 cfs/(in x sq. mi)
B. Total Site Area excluding "Self-Crediting" BMPs 1.50 ac
C. Q_{100} = $Q_{100\text{-}per}$ + $Q_{100\text{-}imp}$ (from W6 and W7, respectively) 5.556 in
D. Peak Flow (PF) = Q_P x Q_{100} x Area / 640 9.67 cfs
E. Delta = PF - 0.15 x Area (ac) 9.45 cfs
[0.15 x Area (ac)] 0.22 cfs
F. V_{det} = Delta / PF x V_{100} 18,216 cft
Required Detention not including infiltration credit or penalty.
Sediment Forebay Volume Required (5% of V100) 932 cft

Retention

A. Vret = 2 x V_{100} 37,298 cft

W11 - Determine Applicable BMPs and Associated Volume Credits

Infiltration test pits were performed in 2015 to determine infiltration rates for this site. The Test Pit #1 at the location of the storm tanks infiltrated at 27.75 inches/hour, which at a factor of safety of 2.0 gives 13.8 inches/hour. As there is a 10.0 inch/hour maximum rate in the WCWRC regulations, we are using this for design.

		Storage Volume (cft)		Design Infilt. Rate	Infilt. Volume in 6-hr	Total Volume
Proposed BMP	Area (sft)	Surface	In Soil	(in/hr)	Drawdown (cft)	Reduction (cft)
Pervious Pavement					0	0
Infiltration Bed					0	0
Subsurface Infiltration Bed (RTank)	2800	10,416		10.00	14,000	24,416
Infiltration Trench					0	0
Bioretention Systems					0	0
Rain Gardens					0	0
Dry Well					0	0
Bioswale					0	0
Vegetated Filter Strip					0	0
Green Roof					0	0
				Total Volume Reduction Credit by Proposed Structural BMPs (cft)		24,416
				Runoff Volume Infiltration Requirement (Vinf) from W9 (cft)		7,575
				Runoff Volume Credit (cft)		16,841

W12 - Natural Features Inventory

There are no natural features located on this site due to it being an existing built out urban site.
Refer to **Sheet C1.1** for location and size of natural features.

W13 - Site Summary of Infiltration & Detention

A. Stormwater Management Summary

Min Infiltration Requirement (V_{inf})	7,575 cft
Designed/Provided Infiltration Volume	24,416 cft
% Minimum Required Infiltration Provided	322 %
Total Calculated Detention Volume, V_{det}	18,216 cft
Net Required Detention Volume (V_{det} - Designed/Provided Infiltration Volume)	-6,200 cft

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

% Required Infiltration NOT Provided	0.0 %
(100% - % Minimum Required Infiltration Provided)	
Net % Penalty (20% x % Required Infiltration NOT Provided)	0.0 %
Total Required Detention Volume, including penalty	**(6,200) cft**
[(100% + Net % Penalty) x Net Required Detention Volume)]	

Detention Outlet Calculations

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

Storm Event	Req'd Volume	less	Infil. Credit	=	Final Volume
First Flush	3,645 cft	-	14,000 cft	=	**0** cft
Bankfull	7,575 cft	-	14,000 cft	=	**0** cft
100 -year	18,216 cft	-	14,000 cft	=	**4,216** cft
Forebay Volume Required (5% of 100-yr)				=	**932** cft

B. Detention Volumes Provided

Elevation	Area (sft)	Depth (ft)	Volume (cft)*	Cum. Volume (cft)
763.0	2,800	0	0	0
764.0	2,800	1	2,604	2,604
765.0	2,800	1	2,604	5,208
766.0	2,800	1	2,604	7,812
767.0	2,800	1	2,604	10,416
769.5	0	2.5	0	10,416
			Total Volume =	36,456

* RTank is 93% voids

Storage Elevation Calculation

First Flush Elevation (Xff)= (764.0 - 763.0) / (2,604 - 0) = (Xfr - 763.0) / (0 - 0) Xff = 763.00 ft

Bankfull Elevation (Xbf)= (764.0 - 763.0) / (2,604 - 0) = (Xbf - 763.0) / (0 - 0) Xbf = 763.00 ft

100-Year Elevation (X100)= (765.0 - 764.0) / (5,208 - 2,604) = (X_{100} - 764.0) / (4,216 - 2,604) X100 = 764.62 ft

C. Full Infiltration Design

Total Storage Volume	4,216 cft
Infiltration Area	2800 sft
Infiltration Rate, Average	10.00 in/hr
Infiltration Flow Rate	2333.33 cft/hr
Time to Fully Drain	**1.8 hr**

This is less than 48 hours max, so the basin complies with the drawdown requirement.

STORM PIPE CALCULATION SHEET

Racquet Club - Pump House & Site Renovation - 20213 - 5/26/2021

Runoff Formula: Q = CIA

MIDWESTERN CONSULTING, INC.
3815 Plaza Drive
Ann Arbor, MI 48108
734-995-0200

I = x/(T+y) x= 175 y= 25
Type of Pipe = HDPE
n = 0.013
Min time of concentration 15.00 min

HGL Manhole Step 0.1 ft

Structure No. From	Structure No. To	Drainage Area A (Acres)	Runoff Coeff. C	CxA	ADD. CxA	Σ CxA	Time T (min.)	Rainfall I (in./hr.)	Q (cfs)	Q Inlet Here	Pipe Dia. (in.)	Pipe Length (ft.)	Pipe Slope %	Velocity Flowing Full (ft./sec.)	Travel Time (min.)	Sewer Capacity (cfs)	Spare Capac. (cfs)	Invert Down	Invert Up	Rim Down	Rim Up	Cover Down	Cover Up	10-year Hydraulic Grade Line (Begins at Bankfull Elevation in Basin) H.G. Slope %	Down stream HGL	Up stream HGL	Down stream HGL Cover	Up stream HGL Cover
R-2	R-1	0.000	0.00	0.000	0.023	0.380	15.33	4.34	1.65	**0.00**	12	6	0.83	4.14	0.02	3.25	1.60	764.00	764.05	769.50	769.25	4.50	4.20	0.21	764.80	764.85	4.70	4.40
R-3	R-2	0.049	0.66	0.032		0.357	15.16	4.36	1.56	**0.16**	12	37	0.60	3.52	0.18	2.77	1.21	764.10	764.32	769.25	768.20	4.15	2.88	0.19	764.95	765.12	4.30	3.08
R-4	R-3	0.388	0.84	0.325		0.325	15.00	4.38	1.42	**1.61**	12	33	0.60	3.52	0.16	2.77	1.35	764.42	764.62	768.20	768.58	2.78	2.96	0.16	765.22	765.42	2.98	3.16
R-5	R-2	0.000	0.00	0.000		0.023	15.05	4.37	0.10	**0.00**	8	9	1.00	3.47	0.04	1.21	1.11	764.45	764.54	769.25	769.58	4.13	4.37	0.01	764.98	765.07	4.27	4.51
R-6	R-5	0.025	0.95	0.023		0.023	15.00	4.38	0.10	**0.13**	8	11	1.00	3.47	0.05	1.21	1.11	764.54	764.65	769.58	768.85	4.37	3.53	0.01	765.17	765.18	4.41	3.67

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

Racquet Club of Ann Arbor – Pump House and Site Renovation
May 26, 2021

Stormwater Narrative:

This redevelopment project follows the the 2016 WCWRC design criteria.

Less than 50% of the site is disturbed, so existing, undisturbed areas continue to drain in their current condition. Since the total site contains more than 10,000 sft of impervious surface area, the 100-year storm will be detained, for the disturbed area. Test pits performed in 2015 indicated excellent infiltration in sandy soils, with a recorded rate of 27.75 inches/hour. The Factor of Safety of 2 gives 13.8 inches/hour, which is greater than the statutory 10.0 inches per hour used in this calculation.

A underground storm chamber infiltration system was installed in the 2016 construction project, and was designed very conservatively to store the full storm volume without any allowance for infiltration to reduce the tank volumes. As a result of this, and based on anecdotal observation that standing water has never been seen in this system, we are using this spare capacity allowed for in the City and County regulations to detain and infiltrate the newly disturbed site areas within the existing RTank system.

Water quality treatment for the first flush storm will be provided by a new underground hydrodynamic separator that will handle the flow from the newly disturbed area, into the chambers. These chambers will also receive the pool backwash and drainage water that is being rerouted from the sanitary sewer as a result of this project, and treated per EGLE regulations.

In case of a failure of the infiltration bed or a storm exceeding the 100-year design storm, an overflow outlet for the storm chambers was installed in 2016 with an invert at the height of the infiltration top of tank.

Outlet Certification:

Based upon the data and criteria outlined above, I hereby certify that the existing drain is the only reasonably achievable stormwater outlet for the proposed stormwater management system, and that the existing drain has sufficient capacity to serve as an adequate outlet for the proposed system, without detriment to or diminution of the drainage serve that the existing outlet presently provides.

Signed: _____

Jeremy Matthei, PE #62010 53590

STATE OF MICHIGAN
JEREMY A. MATTHEI
ENGINEER
NO. 53590
LICENSED PROFESSIONAL ENGINEER

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Wireless Communications • Transportation • Landfill Services

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ANN ARBOR, MI 48104
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734-216-0579

RACQUET CLUB OF ANN ARBOR
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
STORM CALCULATIONS

C4.1

DATE: 7/7/2021
SHEET 19 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
20213SW2.dwg

JOB No. 20213

ISSUED:	REV. DATE
CITY SUBMITTAL 1	07-09-21
CITY SUBMITTAL 2	

Stormwater Narrative
Racquet Club of Ann Arbor
August 13, 2015

Ordinance: This project is bound by the Washtenaw County Water Resources Commissioner Rules and Guidelines, Issued August 6, 2014. The regulations require that the greater of the 1-inch storm volume or the increase in the 2-year storm volume be infiltrated, if feasible, and that the 100-year storm runoff be reduced to less than 0.15 cfs/acre. If infiltration is infeasible, an additional 20% penalty is applied to the storage volume required. Additionally, the 1-inch storm must be treated for water quality to remove 80% of total suspended solids.

Portion of Site Modified: If less than 50% of a site is being modified, the portion modified must be fully brought up to standards, and the remainder of the site must be treated for quality. If more than 50% of a site is modified, the full site must be brought up to current standards. This site will be 11.4% modified (0.88 of 7.72 acres), so the modified portion will be infiltrated, with the remainder treated for quality.

General Approach: The site consists of BnB Boyer Loamy Sands, a Type A well-draining soil. However due to current basement flooding issues near the buildings, the project will take the storm water to the north end of the site, near Test Pit 1. Due to the very well draining soils, the project will infiltrate the entire 100-year storm event in less than 48 hours, with the only outlet pipe from the infiltration chambers being an emergency overflow pipe to the existing storm line.

Infiltration Rate: The infiltration test results from Test Pit 1 indicated a 27.75 in/hour infiltration rate. The WCWRC requires a minimum factor of safety of 2, and we are using a factory of safety of 9.25, to obtain a conservative design infiltration rate of 3.00 in/hr. With this rate the full 4' high chambers can infiltrate the 100-year storm in 14.5 hours, well under the 2-year storm infiltration goal of 48 hours.

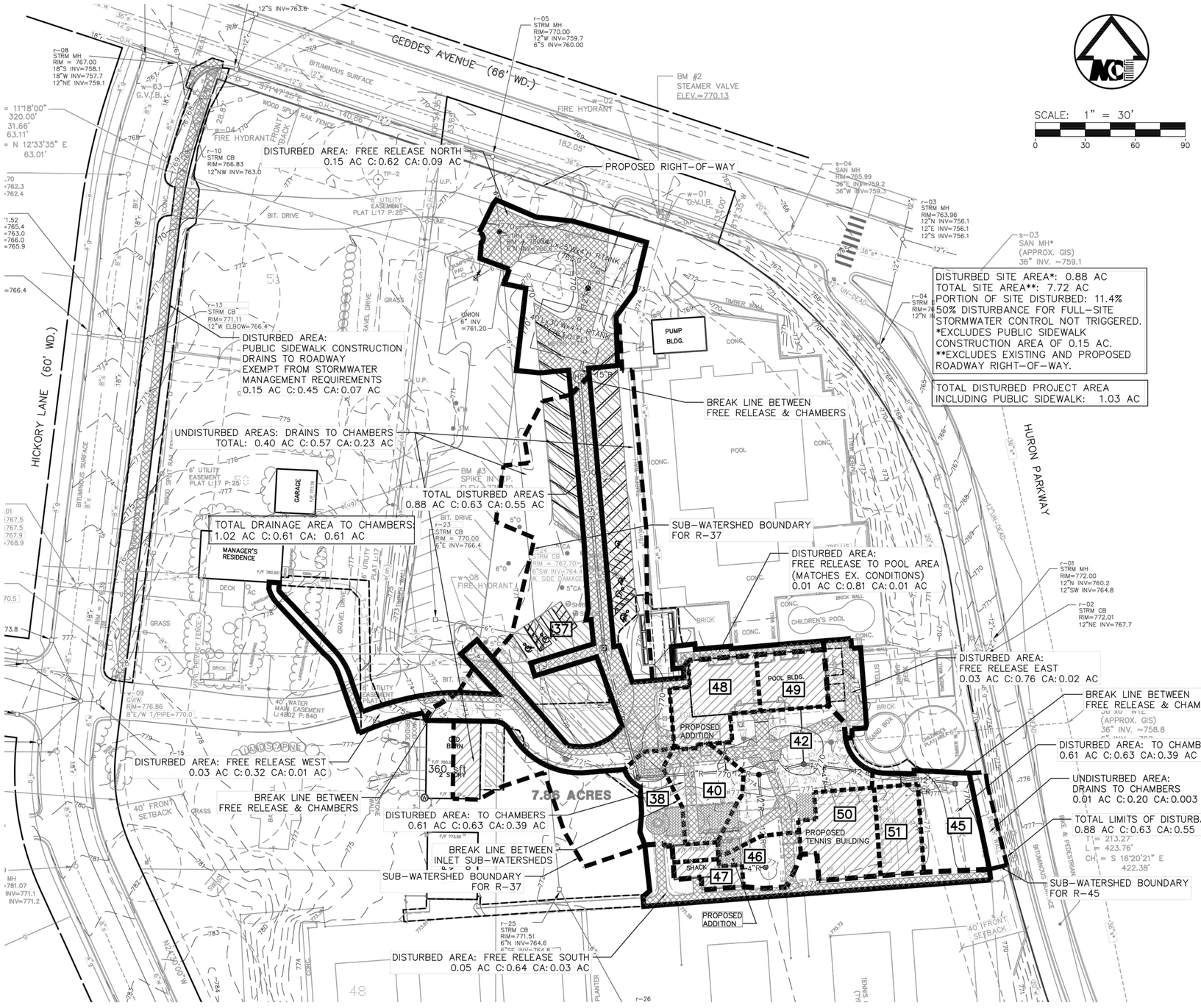
Outlet Path: Presently, most of the paved portions of the site drain through catch basins into a 6-inch storm pipe running from south to north on the site, before tying into the City storm sewer on Huron River Drive. While this pipe is undersized based upon modern design standards, the facility has not faced surface ponding issues due to the generally well-draining soils and the well-established overland flow paths throughout the site. Additionally, portions of the site sheet-flow to the east, south, and north across vegetated surfaces, partially infiltrating into the ground, with the remainder eventually reaching the City's storm sewers in the adjacent roadways.

Infiltration Chamber Design: Due to a desire to preserve landscaping and reduce construction impacts, the infiltration system will be placed underground in chambers, near Test Pit 1. To further reduce site impacts, RTank (or engineer-approved equal) chambers with 93% voids will be used, and the pre-treatment and emergency outlet control with invert at the top of the chamber elevation will also be underground. They are sized to handle the full 100-year storage volume of the disturbed site area, and our calculations indicate that due to infiltration out of the chambers during the storm events, the tank will not overflow when handling the larger stormwater volume routed to them in a 100-year event.

Water Quality Design: Before entering the infiltration chamber, the stormwater will pass through a hydrodynamic separator (Contech CDS or approved equal) sized to handle the pipe capacity leading to it. The hydrodynamic separator will treat the 10-year design storm flow rate (2.6 cfs) to at least the 90% TSS standard, and any remaining solids will be filtered in the soils beneath the infiltration chamber.

Conveyance Systems: New Pipes and swales are designed to convey the 10-year storm without surcharging above the crown of pipe, flowing full, following the calculation methodology in the WCWRC Rules and Guidelines.

Free Release Areas: Certain small areas (0.28 acres) along the edge of the site free-release to the east, west, north, and south, and to the pool, as collecting the water from these areas is difficult. However they are mitigated by taking in 0.41 acres of undisturbed site runoff at Structure R-37 and R-45. Calculations of the "disturbed area runoff" and of the "infiltrated area runoff" were undertaken to ensure that the stormwater requirements would be exceeded. The project intends to use this trade-off of areas to comply with the regulations.



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RACQUET CLUB OF ANN ARBOR
SITE PLAN
STORMWATER MANAGEMENT PLAN

C8.0

DATE: 04/29/2016
SHEET 24 OF 26
CADD: MAJ
SCALE: 1"=30'
PM: SWB
TECH: 14058DA1.dwg

JOB No. 14058

REVISIONS:
ISSUED FOR CONSTRUCTION — REV. DATE 04/29/16

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RACQUET CLUB OF ANN ARBOR
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
2016 PROJECT - STORMWATER PLAN

C4.2

DATE: 7/7/2021
SHEET 20 OF 25
CADD: JBB
SCALE: 1"=30'
ENG.: JAM
PM: RCW
TECH: 20213SW3.dwg

JOB No. 20213

ISSUED:
REV. DATE
CITY SUBMITTAL 1 — 07-09-21
CITY SUBMITTAL 2

Racquet Club of Ann Arbor - Sub-Watershed Analysis
Midwestern Consulting
8/13/2015

Rational C Values:

Soil Type	Roof/Pvmt.	Vegetated	Perm. Paver*	Steep Vegetated (>8%)	Water
A	0.95	0.20	0.25	0.25	1.00
B	0.95	0.30	0.35	0.35	1.00
C	0.95	0.35	0.40	0.40	1.00
D	0.95	0.50	0.55	0.55	1.00

* Steep Vegetated C Value used for permeable pavers.
NRCS Soils Type - Entire Site: BNB - Boyer Loamy Sand - Type A Hydrologic Soil Group - 0.60 - 6.00 in/hour infiltration

Inlet #	sft total area	sft roof	sft pvmt.	total imp.	sft perm. Paver	sft veg.	Soil Type	Imp. C	Perm. Paver C	Veg. C	CxA (sft)	CxA (ac)	Area (ac)	C Value
R-37 (disturbed area)	6,900	0	4975	4,975	72	1,853	A	0.95	0.25	0.20	5,115	0.117	0.158	0.74
R-38	1,585	275	278	553	459	573	A	0.95	0.25	0.20	755	0.017	0.036	0.48
R-40	1,952	0	637	637	384	931	A	0.95	0.25	0.20	887	0.020	0.045	0.45
R-42	4,916	0	1168	1,168	520	3,228	A	0.95	0.25	0.20	1,885	0.043	0.113	0.38
R-45 (disturbed area)	2,320	0	0	0	0	2,320	A	0.95	0.25	0.20	464	0.011	0.053	0.20
R-46	1,099	0	191	191	110	798	A	0.95	0.25	0.20	369	0.008	0.025	0.34
R-47 (Snack Shack)	533	533	0	533	0	0	A	0.95	0.25	0.20	506	0.012	0.012	0.95
R-48 (Pool Bldg.)	2,222	2222	0	2,222	0	0	A	0.95	0.25	0.20	2,111	0.048	0.051	0.95
R-49 (Pool Bldg.)	1,390	1390	0	1,390	0	0	A	0.95	0.25	0.20	1,321	0.030	0.032	0.95
R-50 (Tennis Bldg.)	2,160	2160	0	2,160	0	0	A	0.95	0.25	0.20	2,052	0.047	0.050	0.95
R-51 (Tennis Bldg.)	1,375	1375	0	1,375	0	0	A	0.95	0.25	0.20	1,306	0.030	0.032	0.95
East Free	1,090	223	587	810	0	280	A	0.95	0.25	0.20	826	0.019	0.025	0.76
South Free	2,230	0	1317	1,317	0	913	A	0.95	0.25	0.20	1,434	0.033	0.051	0.64
West Free	1,165	0	182	182	0	983	A	0.95	0.25	0.20	370	0.008	0.027	0.32
North Free	6,637	0	3679	3,679	0	2,958	A	0.95	0.25	0.20	4,087	0.094	0.152	0.62
To Pool Free	583	0	478	478	0	105	A	0.95	0.25	0.20	475	0.011	0.013	0.81
R-37 - (From Undisturbed)	17,210	740	7723	8,463	0	8,747	A	0.95	0.25	0.20	9,789	0.225	0.395	0.57
R-45 - (From Undisturbed)	575	0	0	0	0	575	A	0.95	0.25	0.20	115	0.003	0.013	0.20
Hickory Sidewalk (Exempt)	6,596	0	2190	2,190	0	4,406	A	0.95	0.25	0.20	2,962	0.068	0.151	0.45
Subtotals: A = disturbed areas, routed through detention chamber. B = disturbed areas, free released. C = undisturbed areas, routed through infilt. chamber. D = Total into #37. E = Total into #45														
A (Dist/Inf)	26,452	7,955	7,249	15,204	1,545	9,703	A	0.95	0.25	0.20	16,771	0.385	0.607	0.63
B (Dist/Rel)	11,705	223	6,243	6,466	0	5,239	A	0.95	0.25	0.20	7,191	0.165	0.269	0.61
C (Undist/Inf)	17,785	740	7,723	8,463	0	9,322	A	0.95	0.25	0.20	9,904	0.227	0.408	0.56
D (Total R-37)	24,110	740	12,698	13,438	72	10,600	A	0.95	0.25	0.20	14,904	0.342	0.553	0.62
D (Total R-45)	2,895	0	0	0	0	2,895	A	0.95	0.25	0.20	579	0.013	0.066	0.20
Totals to determine stormwater treatment required: A + B (All disturbed areas)														
A+B (disturbed)	38,157	8,178	13,492	21,670	1,545	14,942	A	0.95	0.25	0.20	23,961	0.550	0.876	0.63
Totals to determine proposed system: A + C (Treating C instead of B to allow for practical water distribution)														
A+C (proposed)	44,237	8,695	14,972	23,667	1,545	19,025	A	0.95	0.25	0.20	26,675	0.612	1.016	0.60

Proposed stormwater treatment plan:
Because C > B, and infiltration is feasible near C but not by B, the project intends to treat C instead of B as follows:
1) Provide underground storage chambers for the 100-year storm in Area A, near Area A, to release at 0.15 cfs/acre of A
2) Provide underground infiltration chambers for the 2-year storm in Area C, instead of Area A
3) Provide additional storage for Area C, sized for the volume of the 100-year storm in Area B. Release rate will be 0.15 cfs/acre of C.
4) By City Code, public sidewalks are exempt from stormwater management requirements, and they are also off the property on City right-of-way, so the Hickory Sidewalk Area is not included in the project stormwater system.

Racquet Club of Ann Arbor
Preliminary Detention/Infiltration Calculations - Summary Table
Midwestern Consulting, LLC
8/13/2015

Portions of the disturbed site free drain, but portions of undisturbed site flow through the stormwater treatment systems.
This table compares the 2-year and 100-year runoff volumes to ensure that the flows actually reaching the stormwater treatment systems are at least as great as the volumes required.

Infiltration Volume Required (Disturbed Area): 3,831 cft 0.088 ac-ft
Actual 2-year Volume (Detained Area): 4,184 cft 0.096 ac-ft

Total 100-year Runoff Required (Disturbed Area): 9,252 cft 0.21 ac-ft
Actual 100-year Volume (Detained Area): 10,137 cft 0.233 ac-ft

Volume Provided:

RTank Chambers are used to conserve space and reduce surface demolition and construction costs.

Sizing Calculations
Storage Required: 10,137 cft
Void Ratio of Chambers: 93%
RTank Volume Required: 10,900 cft

Bottom of Chambers: 763.0 Infiltration Test Elevation
Top of Chambers: 767.0 (2.5' under low point of 769.5, 3' under pavement of 770.0)
Height of Chambers 4.0 ft
Rtank Area Required: 2,725 sft minimum area required to store stormwater in 4' height.

Check for Infiltration:
Infiltration Rate by TP-1 27.75 in/hr
Factor of Safety 9.25 (WCWRC 2 minimum - also accounting for soils variation)
Design Infiltration Rate 3.00 in/hr 0.250 ft/hr 3 in/hr to be conservative

Time to Infiltrate 48 hr
Minimum Volume to Infiltrate per hour 211 cft/hr
Minimum Infiltration Area 845 sft minimum infiltration area required.

RTank Area Provided 2,800 sft

W13 - Storage-Elevation Data

Basin Storage Information

Elevation (ft)	Area (sft)	Volume (cft)	Cum. Volume (cft)	Cum. Volume (ac-ft)
763	2,800	2,604	2,604	0.06
764	2,800	2,604	5,208	0.12
765	2,800	2,604	7,812	0.18
766	2,800	2,604	10,416	0.24
767	0	0	10,416	0.24
769.5	0	0	10,416	0.24

Bottom of Basin
Top of Chamber and Overflow Weir
Low Point Ground Elevation

Storage Volumes
1" Event 2,223 cft 0.05 ac-ft
2-year Event volume 4,184 cft 0.10 ac-ft
100-year Tank volume 10,137 cft 0.23 ac-ft

Infiltration Rate 700 cft/hr 0.016 ac-ft/hr 0.19 cfs
Time to infiltrate 1" event 3.2 hr (<24 hours)
Time to infiltrate 2-year event 6.0 hr (<48 hours)
Tiime to infiltrate 100-year event 14.5 hr

Storage Elevations
Elevation for 1" event 763.85 Elevation 0.85 ft. depth
Elevation for 2-year event 764.61 Elevation 1.61 ft. depth
Elevation for 100-year event 766.89 Elevation 3.89 ft. depth

Racquet Club of Ann Arbor
Outlet Certification
8/13/2015

Outlet from Chambers:

The infiltration chambers are designed to infiltrate the full 100-year storm into the ground in less than 24 hours. The measured infiltration rate at Test Pit 1 was 27.75 in/hr, and we have applied a factor of safety of 9.25 to use a conservative design rate of 3.00 in/hr. This matches the NRCS soils type of BnB Boyer Loamy Sand, a Type A soil.

In case of a failure of the infiltration bed or a storm exceeding the design capacity, and overflow outlet with an invert at the height of the infiltration chamber top has been provided to the existing 6" drainage pipe through the site. Although the 6" pipe is undersized to handle a 10-year storm, the existing site's sandy soils and overland overflow paths have ensured that water ponding on the existing site has not been a problem. The renovations to the site will be reducing the flow through the existing system, and reducing the overland flow off of the site, improving the existing drainage conditions.

Outlet Certification:
Based upon the data and criteria outlined above, I hereby certify that the existing drain is the only reasonably achievable stormwater outlet for the proposed stormwater management system, and that the exiting drain has sufficient capacity to serve as an adequate outlet for the proposed system, without detriment to or diminution of the drainage serve that the existing outlet presently provides.

Signed: _____
Jeremy Matthei, PE #62010 53590

STATE OF MICHIGAN — JEREMY A. MATTHEI — ENGINEER NO. 53590 — REGISTERED PROFESSIONAL ENGINEER

STORM DRAINAGE CALCULATION SHEET
Racquet Club of Ann Arbor - 14058.00 - 8/13/2015

MIDWESTERN CONSULTING, INC.
3815 Plaza Drive
Ann Arbor, MI 48108
734-995-0200

Runoff Formula: Q = CIA
I = x/(T+y) x = 175 y= 25 (10 Year Storm Event)
Type of Pipe = rcp
n = 0.013
Min time of concentration 15.00 min

Structure No. From	Structure No. To	Drainage Area A (Acres)	Runoff Coeff. C	CxA	ADD. CxA	Σ CxA	Time T (min.)	Rainfall I (in./hr.)	Q (cfs)	Q Inlet Here	Pipe Dia. (in.)	Pipe Length (ft.)	Pipe Slope %	H.G. Slope %	Velocity Flowing Full (ft./sec.)	Travel Time (min.)	Sewer Capacity (cfs)	Spare Capac. (cfs)
R-31	R-30										6	15	6.48	0.00	7.29	0.03	1.43	1.43
R-34	R-32										12	18	0.77	0.00	3.99	0.08	3.13	3.13
R-36	R-35	0.000	0.00	0.000		0.613	17.32	4.14	2.54	0.00	15	9	0.40	0.15	3.34	0.04	4.10	1.56
R-37	R-36	0.553	0.62	0.343		0.613	16.50	4.22	2.59	1.50	15	164	0.40	0.16	3.34	0.82	4.10	1.51
R-38	R-37	0.036	0.48	0.017		0.270	16.18	4.25	1.15	0.08	12	73	0.67	0.10	3.72	0.33	2.92	1.78
R-39	R-38	0.000	0.00	0.000		0.253	16.11	4.26	1.08	0.00	12	13	0.50	0.09	3.22	0.07	2.53	1.45
R-40	R-39	0.045	0.45	0.020	0.048	0.253	15.89	4.28	1.08	0.09	12	43	0.50	0.09	3.22	0.22	2.53	1.44
R-41	R-40	0.000	0.00	0.000	0.020	0.184	15.76	4.29	0.79	0.00	12	20	0.35	0.05	2.69	0.12	2.11	1.32
R-42	R-41	0.113	0.38	0.043	0.030	0.164	15.58	4.31	0.71	0.19	12	29	0.35	0.04	2.69	0.18	2.11	1.40
R-43	R-42	0.000	0.00	0.000	0.048	0.091	15.50	4.32	0.39	0.00	12	14	0.35	0.01	2.69	0.09	2.11	1.72
R-44	R-43	0.000	0.00	0.000	0.030	0.044	15.20	4.35	0.19	0.00	12	47	0.35	0.00	2.69	0.29	2.11	1.92
R-45	R-44	0.066	0.20	0.013		0.013	15.00	4.38	0.06	0.06	12	33	0.35	0.00	2.69	0.20	2.11	2.06
R-46	R-41	0.025	0.34	0.009		0.020	15.08	4.37	0.09	0.04	12	59	0.50	0.00	3.22	0.31	2.53	2.44
R-47	R-46	0.012	0.95	0.011		0.011	15.00	4.38	0.05	0.05	4	14	2.00	0.07	3.09	0.08	0.27	0.22
R-48	R-40	0.051	0.95	0.048		0.048	15.00	4.38	0.21	0.21	4	18	2.00	1.24	3.09	0.10	0.27	0.06
R-49	R-42	0.032	0.95	0.030		0.030	15.00	4.38	0.13	0.13	4	28	2.00	0.49	3.09	0.15	0.27	0.14
R-50	R-43	0.050	0.95	0.048		0.048	15.00	4.38	0.21	0.21	4	14	2.00	1.19	3.09	0.08	0.27	0.06
R-51	R-44	0.032	0.95	0.030		0.030	15.00	4.38	0.13	0.13	4	3	2.00	0.49	3.09	0.02	0.27	0.14

Please note that based on Manning's equation with an "n" of 0.06 for poor condition natural channel, A 20' wide, 10% side-sloped swale (1' deep), at 1.0% minimum slope, can handle 8.574 cfs at 0.8' full, and 15.55 cfs at full depth.

No inlet > 2.5 cfs (max is 1.50 cfs at R-37)

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RACQUET CLUB OF ANN ARBOR
SITE PLAN
STORMWATER MANAGEMENT CALCULATIONS

RACQUET CLUB OF ANN ARBOR
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
2016 PROJECT – STORMWATER CALCS

C8.1

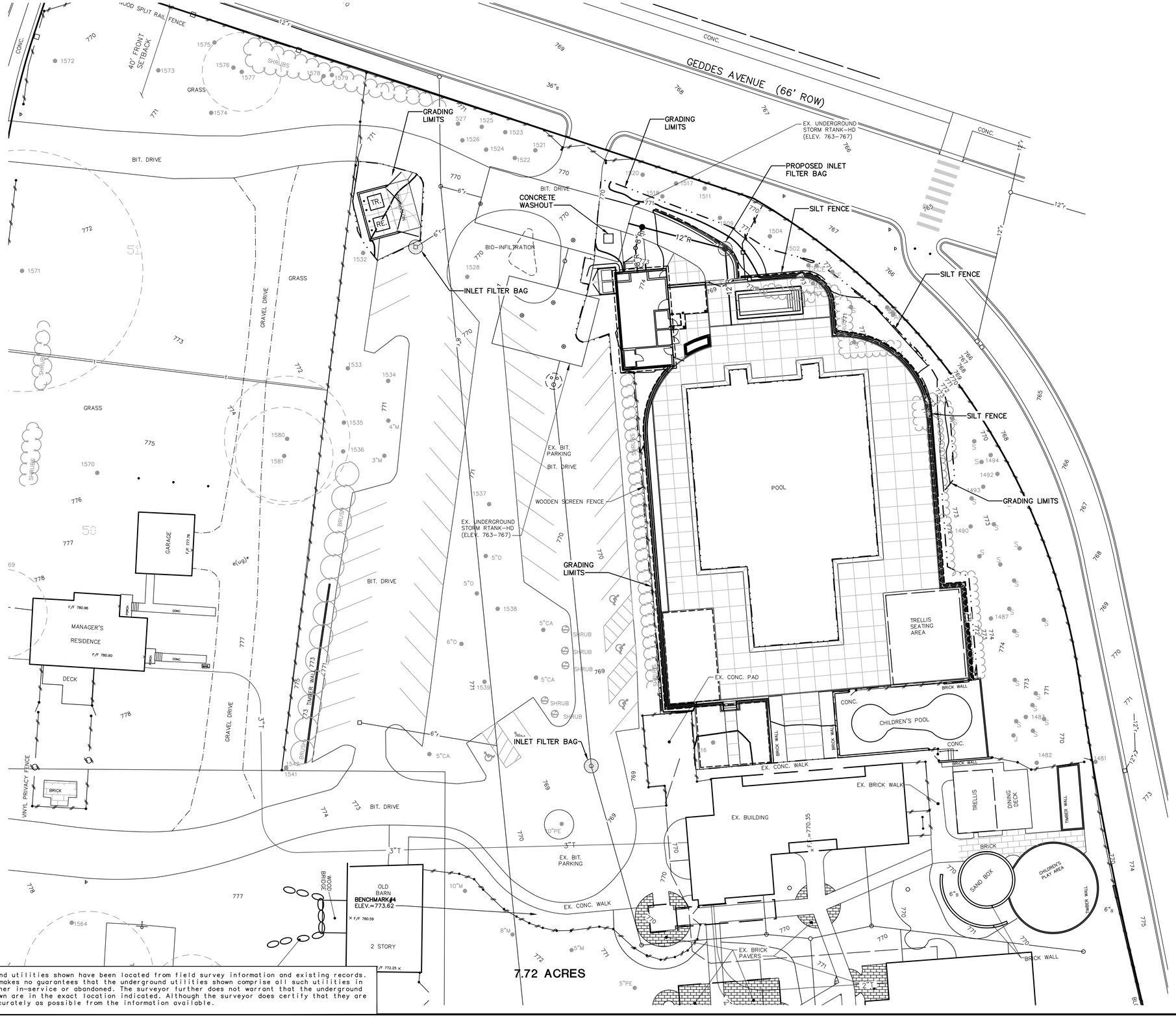
C4.3

DATE: 04/29/2016
SHEET 25 OF 26
CADD: MAJ
ENG: JAM
PM: SWB
TECH:
14058DAQ2.dwg

DATE: 7/7/2021
SHEET 21 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
20213SW3.dwg

JOB No. 14058
REVISIONS:
ISSUED FOR CONSTRUCTION — REV. DATE 04/29/16

JOB No. 20213
ISSUED:
CITY SUBMITTAL 1 — REV. DATE 06-07-21
CITY SUBMITTAL 2 — 07-09-21



SCALE: 1" = 20'

0 20 40 60

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

LEGEND

- EXIST. CONTOUR
- PROP. CONTOUR
- EXIST. UTILITY POLE
- GUY WIRE
- EXIST. OVERHEAD UTILITY LINE
- EXIST. LIGHT POLE
- EXIST. STORM SEWER
- PROP. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- PROP. CATCH BASIN OR INLET
- SIGN
- POST
- FENCE
- SINGLE TREE
- TREE OR BRUSH LIMIT
- SILT FENCE
- INLET FILTER BAG

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PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
SOIL EROSION CONTROL PLAN

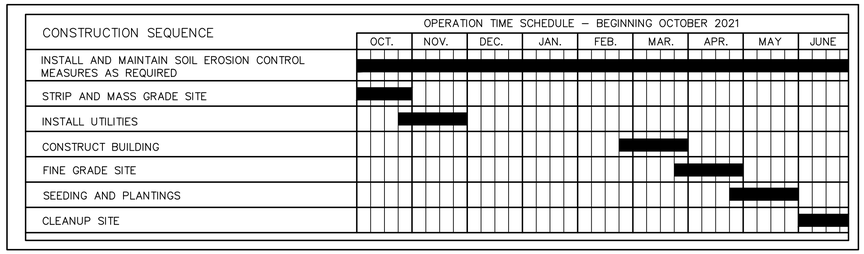
C5.0

JOB No. 20213

ISSUED:

REV.	DATE
CITY SUBMITTAL 1	06-07-21
CITY SUBMITTAL 2	07-09-21

DATE: 7/7/2021
SHEET 22 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
20213SE1.dwg



STORMWATER MAINTENANCE SCHEDULE

DURING CONSTRUCTION:

TASK	Paved Areas	Pervious Areas	Riprap & Silt Fence	Storm Pipes	Catch Basins and Manholes	Inlet Grates	Flow Restriction Devices	Chambers & QC Devices	SCHEDULE	PROJECT COST
Inspect for sediment accumulation	X		X	X	X		X	X	Weekly	$500.00
Removal of sediment accumulation	X		X	X	X		X	X	As needed* & prior to turnover	$1,800.00
Inspect for floatables and debris				X	X	X	X	X	Quarterly	$200.00
Cleaning for floatables and debris				X	X	X	X	X	Quarterly and at turnover	$300.00
Inspect for erosion		X	X						Weekly	$500.00
Reestablish permanent vegetation on eroded slopes		X							As needed* & prior to turnover	$500.00
Clean drives and parking lots	X								Weekly or as determined by permitting agency	$1,000.00
Water disturbed areas to provide dust control	X	X							As needed* & prior to turnover	$800.00
Inspect structural elements during wet weather and compare to as-built plans (by a professional engineer reporting to the owner)			X	X			X	X	Annually and at turnover	$500.00
Make adjustments or replacements as determined by wet weather inspection			X	X			X	X	As needed* & prior to turnover	$1,200.00
									Total Estimated Project Phase Cost	**$7,300.00**

* "as needed" means when sediment has accumulated to a minimum of one foot depth.

Maintenance of soil erosion and sedimentation during construction to be the repsonsibility of the general contractor.

PERMANENT MAINTENANCE:

TASK	Paved Areas	Pervious Areas	Riprap	Storm Pipes	Catch Basins and Manholes	Inlet Grates	Flow Restriction Devices	Chambers & QC Devices	SCHEDULE	ANNUAL COST
Inspect for sediment accumulation	X		X	X	X		X	X	Annually	$500.00
Removal of sediment accumulation	X		X	X	X		X	X	Annually, and as needed*	$1,000.00
Inspect for floatables and debris				X	X	X	X	X	Annually	$200.00
Cleaning for floatables and debris				X	X	X	X	X	Annually, and as needed*	$500.00
Inspect for erosion		X	X						Every six months	$350.00
Reestablish permanent vegetation on eroded slopes		X							As needed*	$350.00
Clean drives and parking lots	X								Annually	$300.00
Mowing		X							Weekly during growing season* * Mowing within 25' of storm basin is only allowed twice per year.	$250.00
Inspect structural elements during wet weather and compare to as-built plans (by a professional engineer reporting to the owner)			X	X			X	X	Annually	$100.00
Make adjustments or replacements as determined by wet weather inspection			X	X			X	X	As needed*	$200.00
Keep records of all inspections and maintenance									Annually	$150.00
Keep records of all costs for inspections,									Annually	$150.00
Property owner to review cost-effectiveness of the preventative maintenance program and make necessary adjustments.									Annually	$150.00
Onwer to hire a professional engineer to carry out emergency inspections upon identification of severe problems.									As needed*	$150.00
									Total Estimated Annual Maintenance Cost	$4,350.00

* "as needed" means when sediment has accumulated to a minimum of one foot depth.

Permanent maintenance of soil erosion and sedimentation control to be the responsibility of Clover Development.

NOTE: No chemicals are allowed in stormwater features or buffer zones with the following exception: Invasive species may be treated with chemicals by a certified applicator.

SOIL EROSION AND SEDIMENTATION CONSTRUCTION NOTES:

1. ALL SOIL EROSION CONTROL MEASURES SHALL COMPLY WITH THE CURRENT CITY OF ANN ARBOR ORDINANCES, WASHTENAW COUNTY STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, AND STATE OF MICHIGAN "SOIL EROSION AND SEDIMENTATION CONTROL ACT" (ACT #347).

2. CONTRACTOR SHALL HAVE A PRE–GRADING MEETING WITH THE CITY OF ANN ARBOR SOIL EROSION CONTROL STAFF PRIOR TO ANY GRADING ACTVITIES.

3. THE SITE REQUIRES AN SESC PERMIT FROM THE CITY OF ANN ARBOR. INSPECTIONS WILL BE PERFORMED BY A CERTIFIED MDEQ STORM WATER OPERATOR AT LEAST ONCE A WEEK AND IMMEDIATELY FOLLOWING EACH PRECIPITATION EVENT.

4. PRIOR TO COMMENCING EARTHMOVING OPERATIONS, THE GRADING CONTRACTOR SHALL INSTALL THE MUD TRACKING MAT, THE SILT FENCE AND TEMPORARY GRAVEL FILTER(S) SHOWN ON THE PLANS.

5. ANY LAWN AREA WHICH WILL HAVE A SLOPE STEEPER OR EQUAL TO 3:1 (3 FT. MEASURED HORIZONTALLY AND 1 FT. MEASURED VERTICALLY) SHALL BE SODDED AND PEGGED OR SEEDED AND MULCHED USING A SOIL EROSION CONTROL FABRIC OR BLANKET. HYDROSEEDING MAY BE USED IN LIEU OF SEED AND MULCH OR SOD WHERE SLOPES ARE FLATTER THAN 3:1.

6. THE ACTUAL LOCATION OF THE MUD TRACKING MATS AND THE GRAVEL FILTERS MAY BE ADJUSTED BY THE CONTRACTOR TO MATCH CONTRACTOR'S OPERATIONS AND FIELD CONDITIONS BUT ONLY IF APPROVED BY THE ENGINEER.

7. ALL DISTURBED AREAS, EVEN WHERE FUTURE PAVEMENT AND BUILDINGS ARE PROPOSED, ARE TO BE REVEGETATED PER COUNTY STANDARDS FOR TEMPORARY SEEDING.

8. BOTH INTERNAL AND EXTERNAL STREETS WILL BE CLEANED OF ANY MUD IMMEDIATELY FOLLOWING EACH MUD TRACKING OCCURRENCE.

9. PERMANENT SOIL EROSION CONTROLS ARE REQUIRED TO BE INSTALLED WITHIN 5 DAYS AFTER FINAL GRADING OR FINAL EARTH CHANGE.

10. DRAINAGE FROM ALL IMPERVIOUS AREAS IS TO BE DIRECTED TO THE ON–SITE STORM WATER MANAGEMENT SYSTEM.

11. THE OBTAINING OF BUILDING PERMITS, AND BUILDING FOOTING CONSTRUCTION MAY NOT BEGIN UNTIL THE SITE STORMWATER MANAGEMENT SYSTEM IS INSTALLED AND OPERATIONAL.

12. THE ESTIMATE COST TO ESTABLISH A GRASS SEED MIX IN DISTURBED AREAS, IF CONSTRUCTION WERE TO BE DISCONTINUED, IS $8,000, FOR TOPSOIL SPREADING, SEEDING, AND WATERING.

13. THE PROJECT WILL INVOLVE APPROXIMATELY 450 CYD OF CUT, 70 OF FILL, AND 150 CYD OF UTILITY TRENCH CUT AND BACKFILL. THIS NUMBER WILL VARY BASED UPON CONTRACTOR TECHNIQUES, AND ALL BIDDERS ARE REQUIRED TO PERFORM THEIR OWN EARTHWORK CALCULATIONS BEFORE BIDDING.

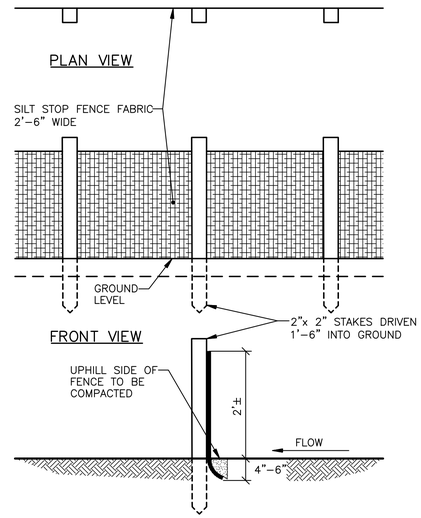
14. THE PROJECT'S DISTURBED AREA IS 21,559 SF (0.49 ACRES).

MAINTENANCE REQUIREMENTS

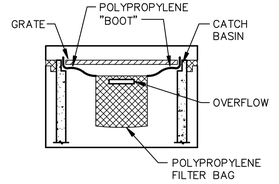
1. ALL STRAW BALE AND/OR SILT FENCE SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT. IF AT ANY TIME THE DEPTH OF SILT AND SEDIMENT COMES TO WITHIN 6" OF THE TOP OF ANY STRAW BALE OR WITHIN 12" OF THE TOP OF ANY SILT FENCE, ALL SILT AND SEDIMENT SHALL BE REMOVED TO ORIGINAL GRADE.

2. ALL TEMPORARY GRAVEL FILTERS SHOULD BE ADJUSTED AS TO LOCATION PER ACTUAL FIELD CONDITIONS. THE REMOVAL OF TRAPPED SEDIMENT AND THE CLEANOUT OR REPLACEMENT OF CLOGGED STONE MAY BE NECESSARY AFTER EACH STORM EVENT DURING THE PROJECT.

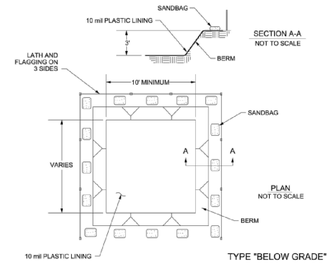
3. ONLY UPON STABILIZATION OF ALL DISTURBED AREAS MAY THE SILT FENCE, AND TEMPORARY GRAVEL FILTERS BE REMOVED. ALSO, ALL STORM SEWERS MUST BE CLEANED OF ALL SEDIMENT.



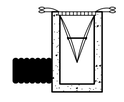
SILT FENCE DETAIL (55t)
NOT TO SCALE



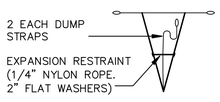
NOTE:
TEMPORARY INLET SEDIMENT FILTER TO BE INSTALLED ON ALL PAVED CATCH BASINS OR STORM INLETS. INLET FILTER TO BE SIMILAR TO "STREAMGUARD" AS MANUFACTURED BY STORMWATER SERVICES CORPORATION (206–767–0441) OR "SILTSACK" AS MANUFACTURED BY ATLANTIC CONSTRUCTION FABRICS, INC.; (800–448–3636). CLEAN FILTER AS NEEDED.



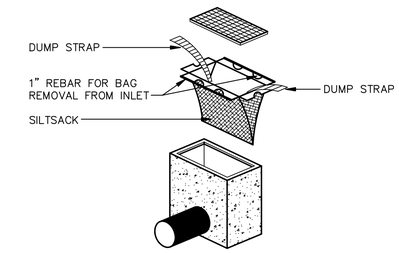
CONCRETE WASHOUT
NOT TO SCALE



INSTALLATION DETAIL



BAG DETAIL



INLET FILTER DETAIL–SILTSACK (58t)
NOT TO SCALE

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PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
SOIL EROSION CONTROL NOTES AND DETAILS

C5.1

JOB No. 20213

ISSUED:

	REV. DATE
CITY SUBMITTAL 1	05-07-21
CITY SUBMITTAL 2	07-09-21

DATE: 7/7/2021
SHEET 23 OF 25
CADD: JBB
ENG: JAM
PM: ROW
TECH:
20213SE2.dwg

LANDSCAPE LEGEND

- -S PROPOSED CANOPY TREE (STREET TREE)
- -R PROPOSED DECIDUOUS SHRUBS (RIGHT OF WAY SCREENING)
- -R PROPOSED EVERGREEN SHRUBS (RIGHT OF WAY SCREENING)
- ### EXISTING TREE TO REMAIN
- PROPOSED LAWN AREA
- PROPOSED LANDSCAPE BED AND MULCH
- EXISTING VEHICULAR USE AREA – BIO-RETENTION
- EXISTING VEHICULAR USE AREA
- VEHICULAR USE AREA LIMITS

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

SCALE: 1" = 40'
0 40 80 120

LANDSCAPE REQUIREMENTS

	Required	Proposed
Right-of-way screening		
	10ft when VUA viewed from ROW 1 tree per 30lf; continuous hedge/screen	Hickory Lane - Not applicable Geddes - 14 existing trees to remain, 22 shrubs proposed
Vehicle Use Area		
Interior islands	1:20sf ratio for island, 23,711sf / 20 =1,186sf island	9,546sf existing
Bio-retention island	if >750sf island; 50% bioretention 1,186sf /2 = 593sf bioretention island	1,401sf existing bio-retention
Interior island trees	1 tree per island; 1 tree per 250sf island; 1,186sf / 250 = 5 trees	13 existing trees to remain
Snow pile storage	identify locations on plan	shown on plans
Street Trees		
Street trees	1 tree per 45 lf Hickory Lane - 813lf / 45 = 18 trees Geddes Road - 316lf / 45= 7 trees Huron Parkway - 683lf /45 = 16 trees	Hickory Lane - 18 trees proposed Geddes Road - 7 trees proposed Huron Parkway - 2 existing, 13 trees proposed
Street tree escrow	$1.30 per linear foot frontage Hickory Lane - 813lf x $1.30 = $1056.90 Geddes Road - 316lf x $1.30 = $410.80 Huron Parkway - 683lf Huron Parkway Credit for 2 existing trees: 45 x 2 trees = 90LF. Net Huron Parkway - 683LF-90LF=593LF 593LF x $1.30 = $770.90 Total: $1,056.90 + $410.80 + $770.90 = $2,238.60	$2,238.60 to City Tree Fund prior to issuing building permits.*
Street tree canopy loss fee	Not applicable	Not applicable
Conflicting Land Use Buffer		
VUA screening when adjacent to public park or residential purposes	15ft wide; 1 tree per 15lf, 50% evergreen; continuous screening 4ft	Not applicable; VUA not adjacent to residentially zoned parcels
Tree Mitigation		
	50% DBH of Woodland and LM	Not Applicable
Outdoor refuse		
	screening required from adjacent residential use	screening wall around dumpsters proposed
Private streets and shared driveways		
	1 tree per 30lf; buffer between adjacent parcel and shared driveway/private street	Not applicable

*Checks for street tree escrow are to be made payable to City of Ann Arbor and mailed to Systems Planning Unit, 301 E. Huron Street, PO Box 8647, Ann Arbor, Michigan 48107-8647. Attn: Tiffany Giacobazzi. Include the project name and number on the check.

PLANT SCHEDULE

Total	Street Tree (-S)	ROW Screening (-R)	Symbol	Botanical Name	Common Name	Size	Spacing	Root	Remarks
Deciduous Trees									
9	9		Cca	*Cercis canadensis ' Ace of Hearts'*	Ace of Hearts Redbud	2.5" cal.	20' o.c.	B&B	tree form
3	3		CC	*Cotinus coggygria*	European Smoketree	2.5" cal.	15' o.c.	B&B	
3	3		OV	*Ostrya virginiana*	Hop Hornbeam	2.5" cal	20' o.c.	B&B	
4	4		PS	*Prunus sargentii*	Sargent Cherry	2.5" cal.	20' o.c.	B&B	tree form
7	7		GB	*Ginkgo biloba 'Princeton Sentry'*	Princeton Sentry Ginkgo	2.5" cal.	per plan	B&B	male only
2	2		QI	*Quercus imbricaria*	Shingle Oak	2.5" cal.	25' o.c.	B&B	
10	10		SR	*Syringa reticulata 'Ivory Silk'*	Japanese Tree Lilac	2.5" cal.	20' o.c.	B&B	
5	0	5	TO	*Thuja occidentalis 'Smaragd'*	Emerald Green Arborvitae	4'-5' ht.	6' ht	B&B	
43	38	5	Total						
Shrubs									
5		5	AM	*Aronia melanocarpa*	Black Chokeberry	#5 Cont.	24" ht		
5		5	TT	*Taxus x "Tautonii"*	Taunton Yew	#5 Cont.	24" ht		
7		7	VD	*Viburnum dentatum 'Christom'*	Blue Muffin Arrowwood Viburnum	#5 Cont.	24" ht		
17	0	17	Total						

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RACQUET CLUB OF ANN ARBOR
PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
OVERALL LANDSCAPE PLAN

L1.0

DATE: 7/9/2021
SHEET 24 OF 25
CADD: JBB
ENG: JAM
PM: RCW
TECH:
20213LP1.dwg

JOB No. 20213

ISSUED:	REV. DATE
CITY SUBMITTAL 1	06-07-21
CITY SUBMITTAL 2	07-09-21

LANDSCAPE NOTES

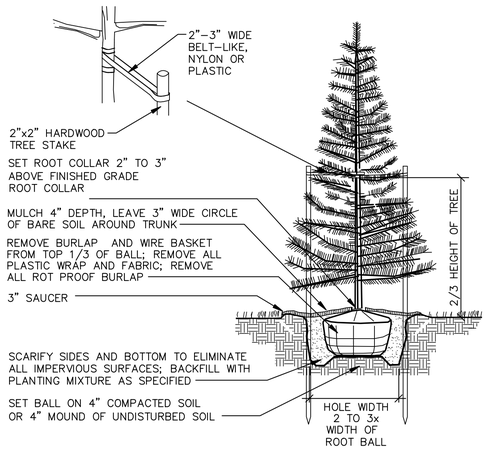
1. For any plant quantity discrepancies between the plan view and the plant schedules, the plant schedule shall take precedence.
2. Plant materials shall be selected and installed in accordance with standards established by the City of Ann Arbor.
3. Water outlets shall be provided within 150 feet of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

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

Maintenance:

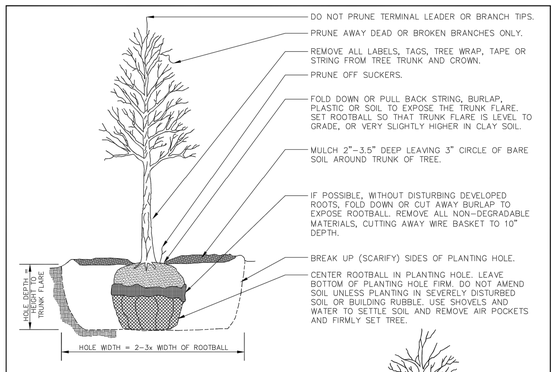
1. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
2. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
3. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
4. Contractor shall warranty all plant material and trees to remain alive and be in healthy, vigorous and like new condition for the specified period from installation to Substantial Completion. The entire Landscaping Project, including but not limited to: plants (perennials), trees, shrubs, mulches, shrubs, etc are to be under Warranty for One Year after Substantial Completion date of the Project. At the end of the specified One Year Warranty period the Owner's Representative will inspect plant material for compliance. Contractor shall replace, in accordance with the drawings and specifications, all plants, trees, shrubs, etc or as determined by the Owner's Representative, are in an unhealthy or unsightly condition. Warranty shall not include damage or loss of plants, trees, and shrubs caused by fires, floods, freezing rains, lightning storms, or winds over 75 miles per hour, acts of vandalism or negligence on the part of the owner, or any other incident beyond landscape contractor's control.
5. Long-term maintenance of the bio-retention island shall be performed by the Owner. Maintenance shall include seasonal trimming and removal of dead foliage, removal of weeds, and removal or mulching of leaves and stems. Spot treatment/removal of invasive weeds may be necessary if localized areas become dominated by invasive weeds. Bio-retention island shall be inspected by owner following any storm event exceeding 1". Trash and debris shall be removed as needed. Shredded hardwood mulch must be re-spread when erosion is evident and be replenished annually. Once every 2 to 3 years, the entire bio-retention/rain garden area may require mulch replacement.
6. Turf installations shall meet the following criteria as determined by Owner:
    a. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
    b. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
    c. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.
7. All plant species deviations from the approved site plan must be approved by the City of Ann Arbor in writing, prior to installation.

NOTE: REMOVE STAKING/GUYING MATERIAL AFTER ONE YEAR.



EVERGREEN TREE PLANTING DETAIL

NOT TO SCALE



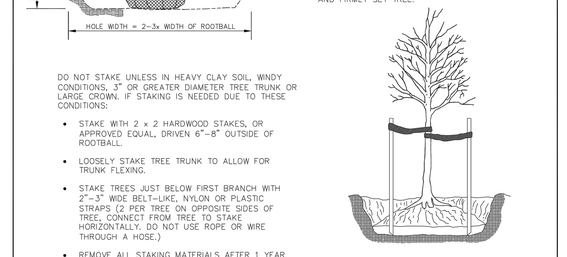
REVISIONS	REV. NO.	DR.BY	CH. BY	DATE

PUBLIC SERVICES DEPARTMENT
CITY OF ANN ARBOR

TREE PLANTING DETAIL

DR. BY	ARG	CH. BY	CSS
SCALE	NONE	DATE	7–23–10
INCH			

DRAWING NO. SD–L–3
SHEET NO. _____ OF _____



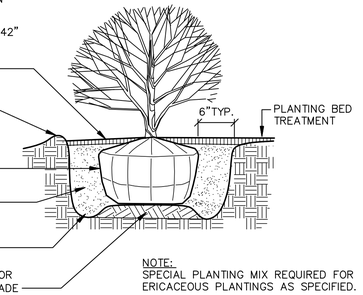
ANNUAL AND PERENNIAL PLANTING

NOT TO SCALE

DO NOT TRIM EVERGREENS

SHRUB SHALL BEAR SAME RELATION TO FINISH GRADE AS IN NURSERY

DO NOT PLANT SHRUBS TO WITHIN 42" OF TREE TRUNKS IN SHRUB BEDS



NOTE:
SPECIAL PLANTING MIX REQUIRED FOR ERICACEOUS PLANTINGS AS SPECIFIED.

SHRUB PLANTING DETAIL

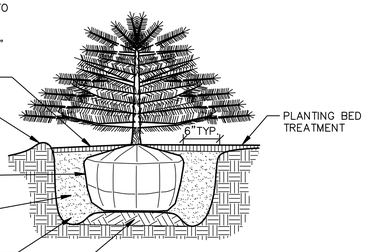
NOT TO SCALE

NOTE:
PRUNE 20% OF BRANCHES AND FOLIAGE RETAINING NORMAL PLANT

SHAPE DO NOT TRIM EVERGREENS

SHRUB SHALL BEAR SAME RELATION TO FINISH GRADE AS IN NURSERY

DO NOT PLANT SHRUBS TO WITHIN 42" OF TREE TRUNKS IN SHRUB BEDS



NOTE:
SPECIAL PLANTING MIX REQUIRED FOR ERICACEOUS PLANTINGS AS SPECIFIED.

EVERGREEN SHRUB PLANTING DETAIL

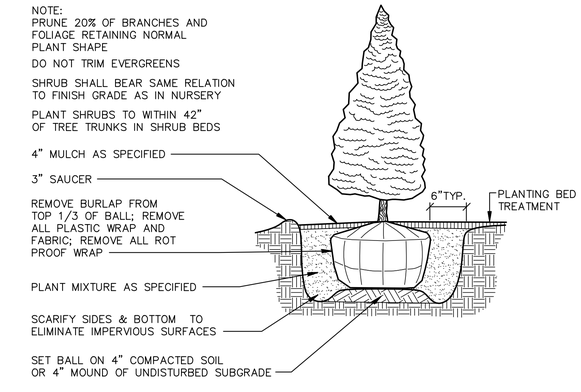
NOT TO SCALE

NOTE:
PRUNE 20% OF BRANCHES AND FOLIAGE RETAINING NORMAL PLANT SHAPE

DO NOT TRIM EVERGREENS

SHRUB SHALL BEAR SAME RELATION TO FINISH GRADE AS IN NURSERY

PLANT SHRUBS TO WITHIN 42" OF TREE TRUNKS IN SHRUB BEDS



NOTE:
SPECIAL PLANTING MIX REQUIRED FOR ERICACEOUS PLANTINGS AS SPECIFIED.

ARBORVITAE PLANTING DETAIL

NOT TO SCALE

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BRENT SCHOMAKER
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PUMP HOUSE & SITE RENOVATION
SITE PLAN ADMINISTRATIVE AMENDMENT
LANDSCAPE NOTES AND DETAILS

L2.0

JOB No. 20213

DATE: 7/9/2021
SHEET 25 OF 25
CADD: JBB
ENG: JAM
PM: ROW
TECH:
20213LP4.dwg

ISSUED:	REV. DATE
CITY SUBMITTAL 1	08-27-21
CITY SUBMITTAL 2	07-09-21