



PRELIMINARY STORMWATER MANAGEMENT REPORT

PROJECT SITE:

**THE RESIDENCES AT NAPER AND PLANK
PLANK ROAD AND TUTHILL ROAD
NAPERVILLE, DUPAGE COUNTY, ILLINOIS**

PREPARED FOR:

Gen-Land, LLC
120 N. LaSalle Street, Suite 2900
Chicago, IL 60602

PREPARED BY:

V3 COMPANIES, LTD.
7325 JANES AVENUE
WOODRIDGE, ILLINOIS 60517
630.724.9200

APRIL 11, 2025

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Plank Road Multifamily – Naperville, IL PRELIMINARY STORMWATER NARRATIVE

PLANK ROAD MULTIFAMILY NAPERVILLE, DUPAGE COUNTY, ILLINOIS

INTRODUCTION

Lincoln Property Company is proposing a development consisting of 17 townhome / rowhome buildings along with improvements to Tuthill and Burlington Roads. The development is located north of the intersection of Tuthill and Plank Roads in the City of Naperville, DuPage County Illinois. The total property area is approximately 8.08 acres with 1.52 acres west of Tuthill Road and 6.56 acres east of Tuthill Road. The stormwater analysis was performed based on the site plan prepared by V3 Companies and the topographic survey prepared by Cemcon, Ltd. and in accordance with the requirements of the DuPage County Stormwater and Floodplain Ordinance.

EXISTING SITE CONDITION

Currently, there is one existing building on the parcel to the west of Tuthill road, and three existing buildings on the parcel to the east of Tuthill Road. Several other houses were located on the property but have been previously demolished. There is also a rounded drive connecting to one of the buildings on the eastern parcel to Tuthill, as well as a gravel drive going through the middle of the eastern parcel. No previous detention has been provided for the onsite area. The western parcel is 1.52 acres, with a ridge line along the southern border which generally makes the parcel drain from the south to the north. The eastern parcel contains 6.56 acres, and sheet drains to ditches around the perimeter, along Tuthill and Plank roads to the west and south, and another roadside ditch to the east along Naper Boulevard. See the existing overall drainage exhibit.

PROPOSED SITE CONDITION

The proposed development consists of 17 townhome / rowhome buildings with ground level garages, roadway improvements, 6 underground stormwater detention vaults, and 1 detention pond. Per the DuPage County Stormwater and Floodplain Ordinance, the development requires runoff storage (detention) and post construction best management practices (PCBMPs). Both detention and PCBMPs will be provided in the proposed detention areas. In the proposed conditions, the western parcel of 1.52 acres will be independently detained from the rest of the site but will drain through the main system and outlet at Naper Blvd. Some flow will be picked up from Tuthill and Plank but not detained. This flow will be bypassed through the system, and that will be reflected in the designed release rate.

POST CONSTRUCTION BEST MANAGEMENT PRACTICES/RETENTION

As specified in Article 8 of the DuPage County Stormwater and Floodplain Ordinance, PCBMPs are required as part of the proposed development in addition to the required detention storage. BMPs (Best Management Practices) are used to treat the stormwater runoff for pollutants and reduce overall runoff volume. The proposed underground detention chambers will have exfiltration joints with open graded stone surrounding the system to allow runoff to infiltrate into the ground before entering the storm sewer system.

The BMP volume is equal to infiltration of 1.25 inches for all new impervious surfaces in the disturbed area. The total impervious area is 4.52 acres. Approximately, 0.47 ac-ft of BMP volume

is required for the proposed development which will be provided by allowing infiltration below the underground detention systems.

DETENTION

Site detention storage is based on 100-year allowable release rate of 0.10 cfs/acre as required by the DuPage County Stormwater and Floodplain Ordinance. An estimated release rate of 0.81 cfs was calculated by the sites size of 8.08 acres.

Detention is provided in underground storm vaults and pond storage. A summary of detention provided is shown in the table below. Approximately 3.64 ac-ft of storage is required for the proposed development. 2.39 ac-ft of detention volume is provided in underground detention, and 1.28 ac-ft is provided within the detention pond.

Storage Summary

Vault Name	Detention Provided
UDS 1	0.387 ac-ft
UDS 2	0.308 ac-ft
UDS 3	0.523 ac-ft
UDS 4	0.186 ac-ft
UDS 5	0.186 ac-ft
UDS 6	0.805 ac-ft
Detention Pond	1.280 ac-ft
SUM	3.675 ac-ft

EMERGENCY OVERFLOW

In the case that the underground detention systems overflow, the water will flow towards Naper Blvd where site grading will allow the water to match the existing drainage pattern. The pond will have an emergency overflow at the southeast corner of the lot holding the pond.

WETLANDS

The site contains a small drainage ditch/wetland associated with drainage for Naper Boulevard. The 2,400 square foot wetland/ditch is regulated by the US Army Corps of Engineers, and an application to fill the entire wetland was submitted to the Corps on October 2, 2024. The wetland/ditch is very low quality and is a man-made feature. Because of the wetland's small size, no mitigation is required for the fill.

The wetland is also regulated under the DuPage County Countywide Stormwater and Flood Plain Ordinance. The wetland boundary has been approved by DuPage County. The wetland falls below the 0.1-acre threshold requirement for mitigation due to the proposed filling. DuPage County will review and certify the request to impact the wetland area.

SEDIMENT AND EROSION CONTROL PLAN

Since the proposed construction activities will disturb more than 1 acre, the site is subject to comply with the IEPA National Pollution Discharge Elimination System (NPDES) ILR10 permit. In accordance with NPDES ILR10, the owner is responsible for installing erosion and sediment control measures, and maintaining them in place until the site has been stabilized at which time

they will be removed. Inspections, remedial work, and record keeping for all soil erosion and sediment control related work shall be performed and documented by the owner. The erosion control plans are included.

SCHEDULE FOR IMPLEMENTATION OF STORMWATER MANAGEMENT PLAN

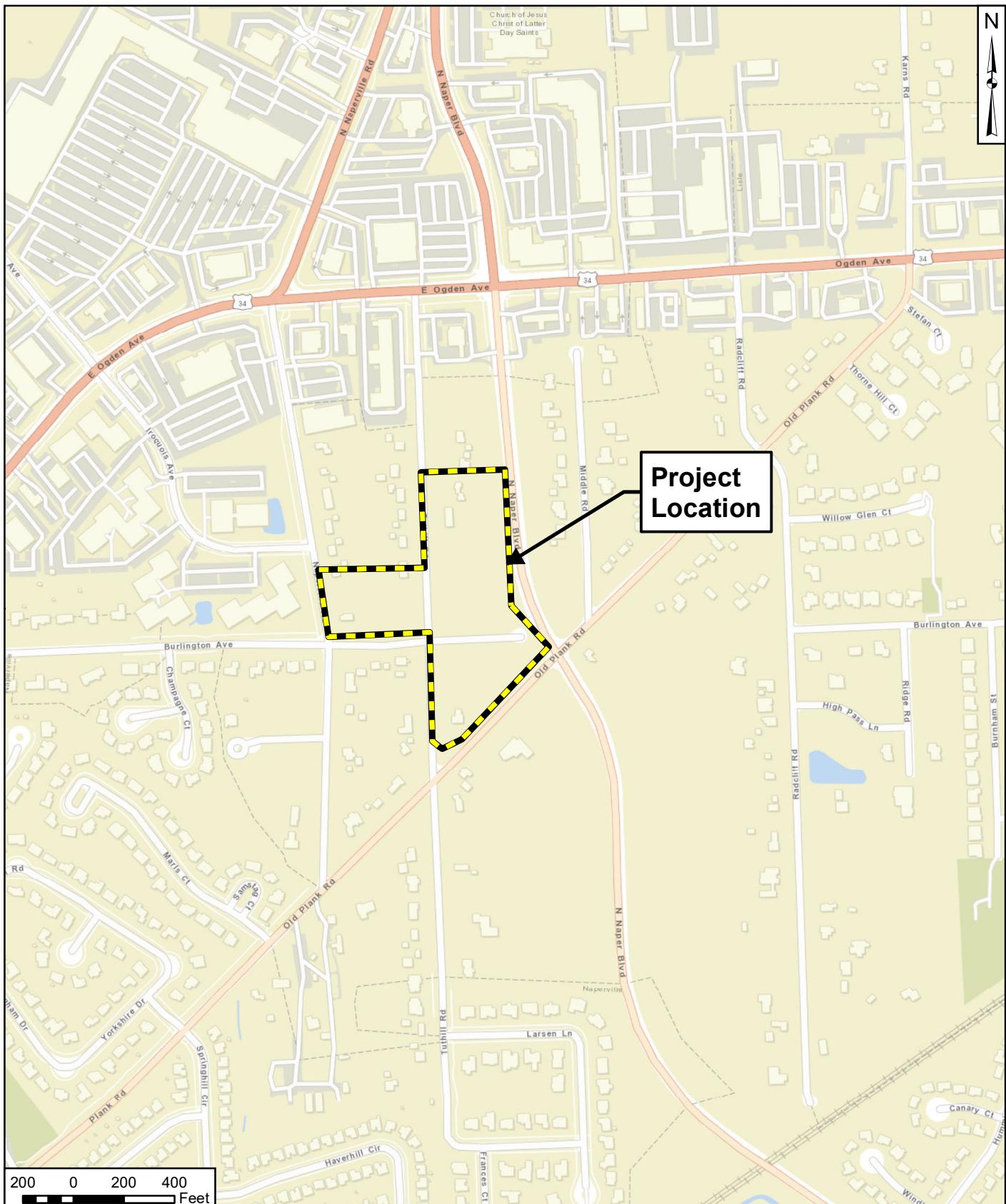
Erosion control measures shall be installed before site construction commences based on the schedule below:

- Install Erosion Control Measures
- Demolition, Clearing and Grubbing
- Site Grading
- Installation of Site Utilities & BMPs
- Temporary Stabilization of Disturbed Areas
- Ongoing Maintenance of Erosion Control
- Establishment of Permanent stabilization
- Removal of Temporary Erosion Control Measures

CONCLUSION

Stormwater management facilities for the proposed development, Plank Road Multifamily, have been designed to meet the requirements of the Ordinance. All of the facilities will provide both detention and water PCBMPs for stormwater runoff from developed areas of the site.

It is our professional opinion that this report complies with the requirements of the Ordinance, and provides a stormwater management system that will effectively control stormwater runoff from the proposed development.



 <p>7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone www.v3co.com</p>	<p>PROJECT NO.: 241072</p> <p>CREATED BY: NJB</p> <p>DATE: 10/22/2024</p>	<p>CLIENT: Lincoln Property Company 120 N. LaSalle Street, Suite 2900 Chicago, IL 60602</p> <p>BASE LAYER: ESRI World Street Map</p>	<p>TITLE: PROJECT LOCATION MAP</p> <p>SITE: Plank Road Multifamily Naperville, IL</p>	<p>FIGURE: 1.0</p>
	<p>SCALE: See Scale Bar</p>			



200 0 200 400
Feet



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PROJECT NO.:

241072

CREATED BY:

NJB

DATE:

10/22/2024

SCALE:

See Scale Bar

CLIENT:

Lincoln Property Company
120 N. LaSalle Street, Suite 2900
Chicago, IL 60602

BASE LAYER:

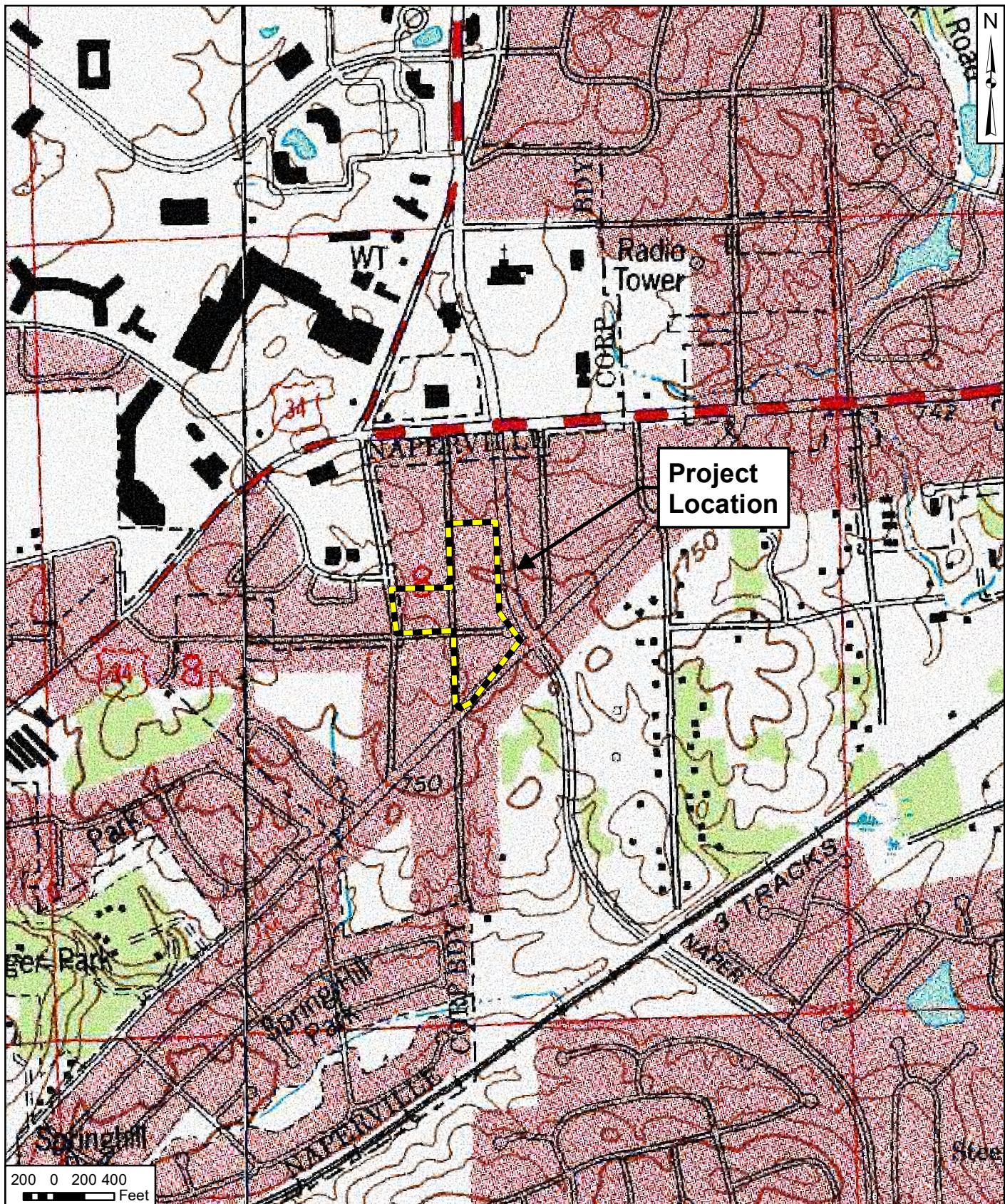
Aerial Imagery
(2020)

TITLE:

AERIAL MAP
Plank Road Multifamily
Naperville, IL

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FIGURE:
2.0



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PROJECT NO.: 241072
CLIENT: Lincoln Property Company
120 N. LaSalle Street, Suite 2900
Chicago, IL 60602
CREATED BY: NJB
DATE: 10/22/2024
BASE LAYER: USGS Topographic Map
Naperville & Weaton
Quadrangles (1993)

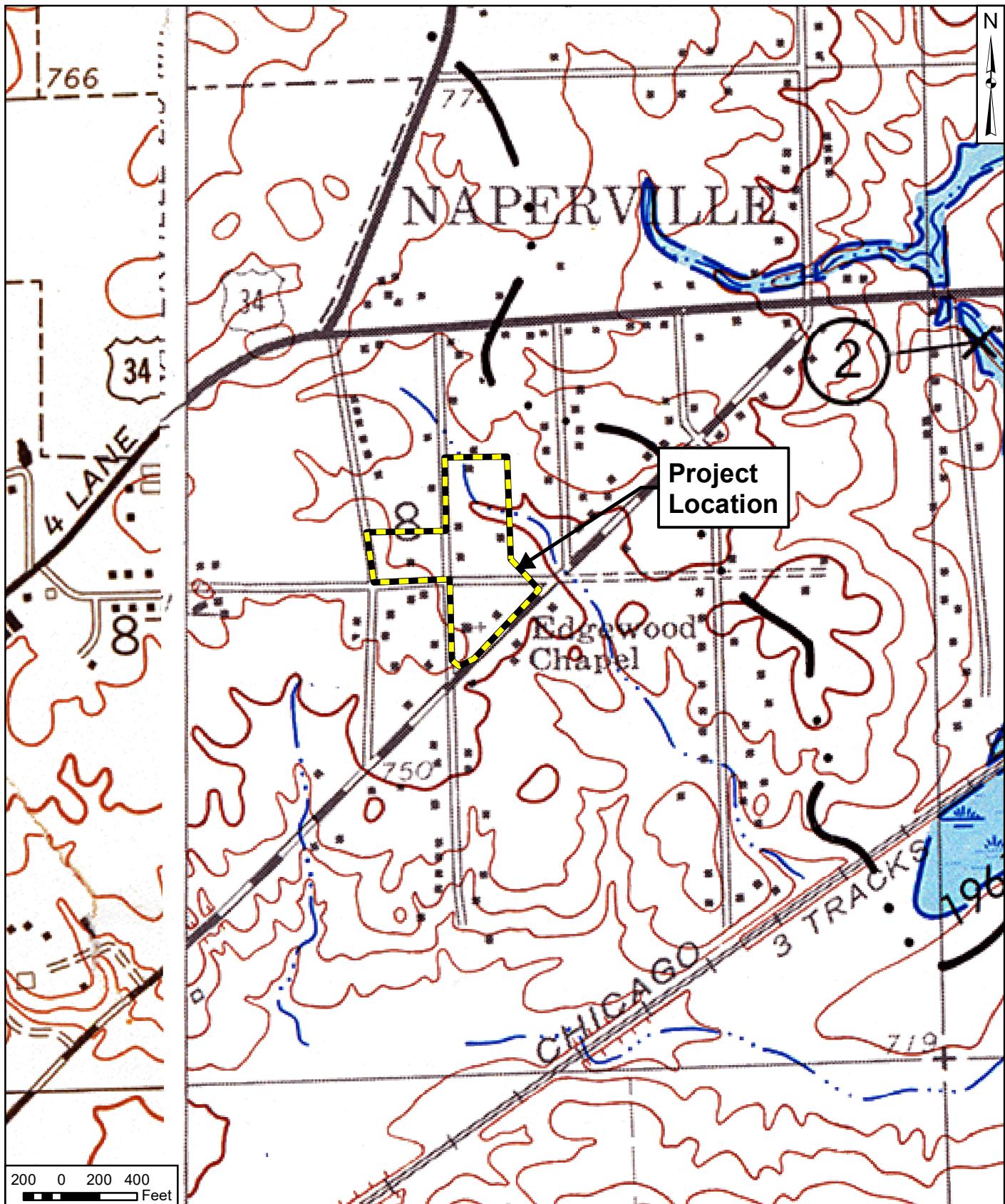
USGS TOPOGRAPHIC MAP

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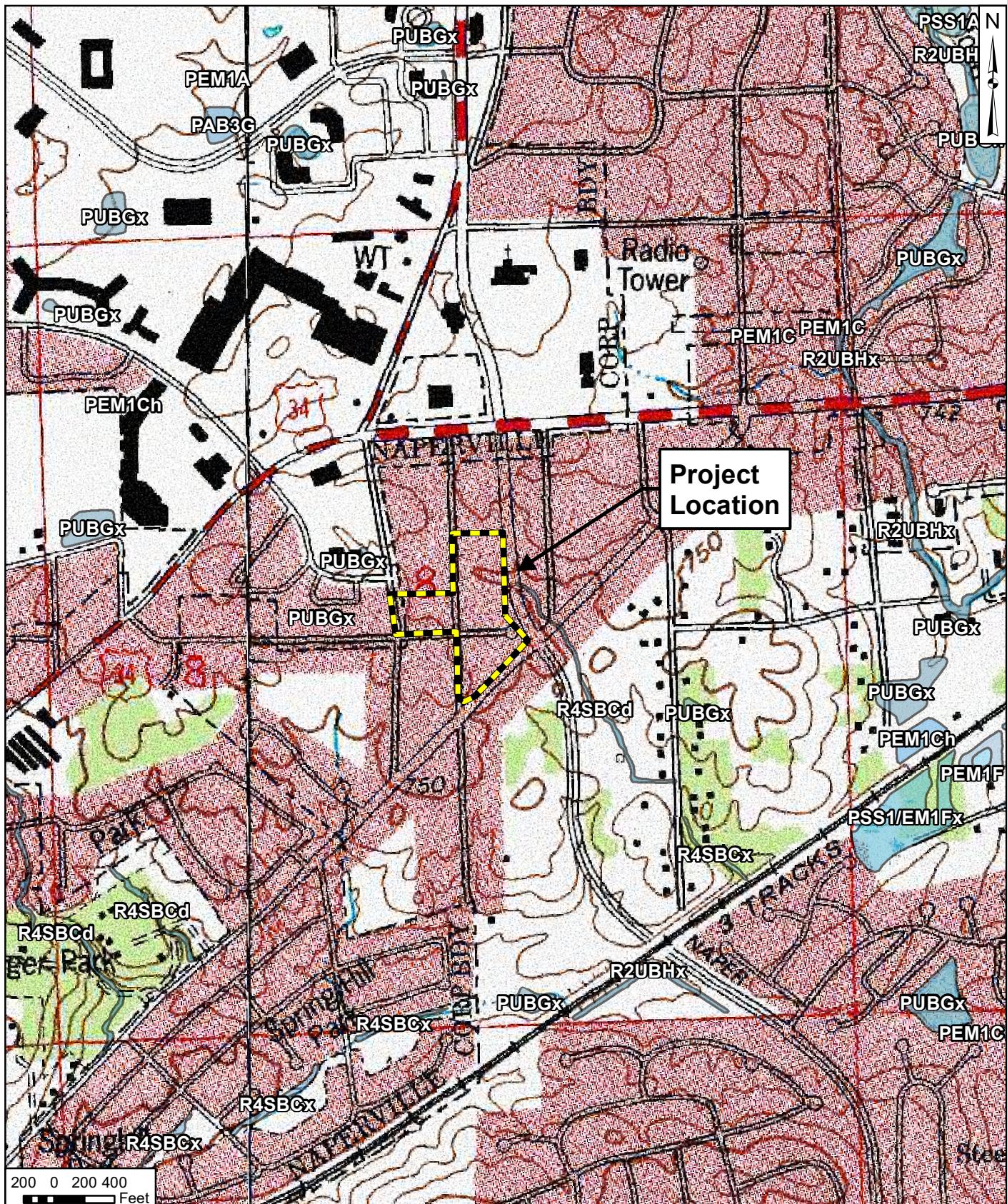
SCALE:
See Scale Bar

SITE:
Plank Road Multifamily
Naperville, IL

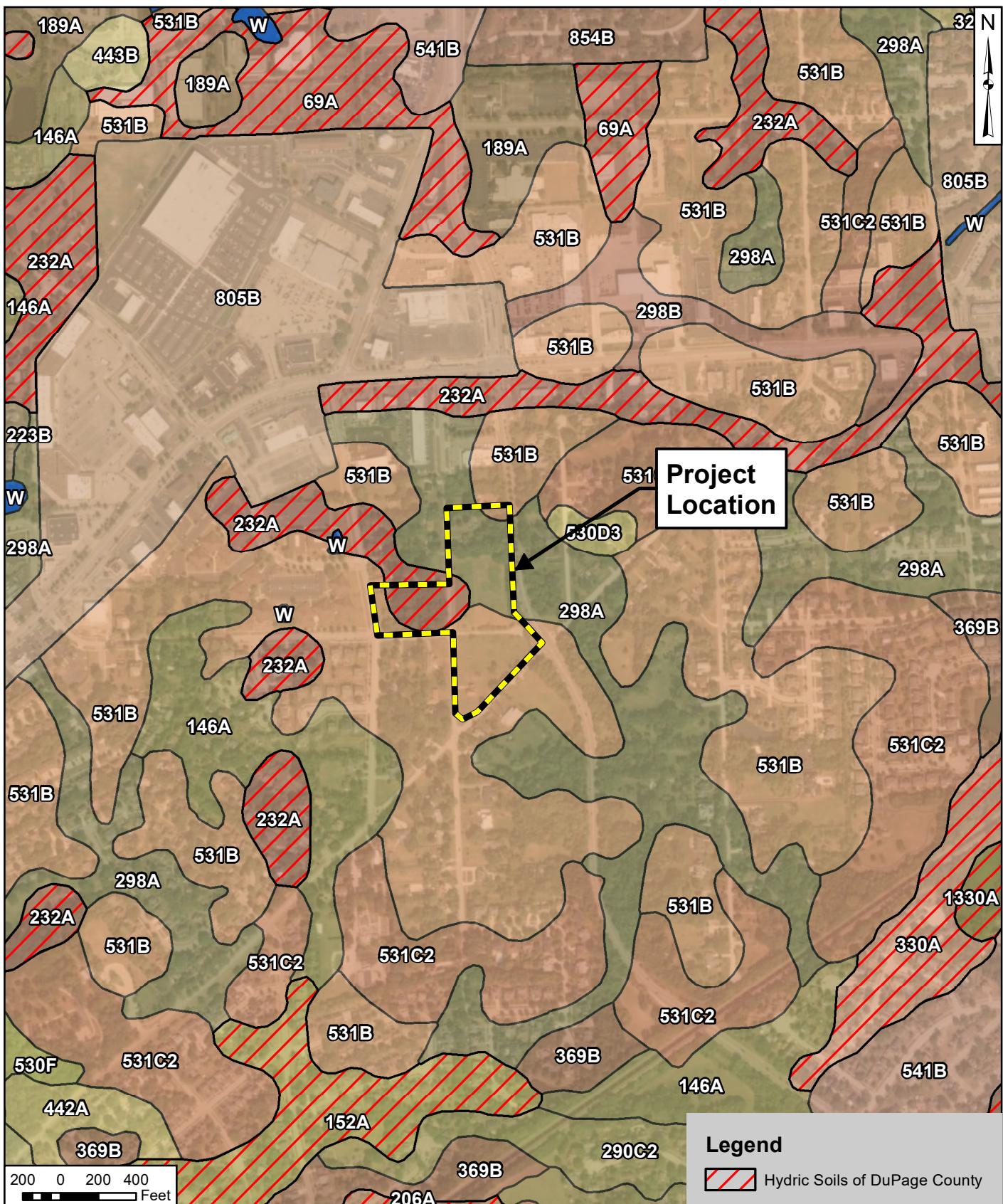
FIGURE:
3.0



 <p>7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone www.v3co.com</p>	<p>PROJECT NO.: 241072 CLIENT: Lincoln Property Company 120 N. LaSalle Street, Suite 2900 Chicago, IL 60602 CREATED BY: NJB</p>	<p>TITLE: USGS HYDROLOGIC ATLAS</p>
<p>Visio, Vertere, Virtute... "The Vision To Transform with Excellence"</p>	<p>DATE: 10/22/2024 BASE LAYER: USGS Hydrologic Atlas Naperville & Wheaton Quadrangles SCALE: See Scale Bar</p>	<p>SITE: Plank Road Multifamily Naperville, IL FIGURE: 4.0</p>
		<p>N:\2024\241072\Reports\LD\DD\ArcGIS\Arc Files\EXH4hydro4241072.mxd</p>



 <p>7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone www.v3co.com</p>	PROJECT NO.:	CLIENT:	TITLE:	
	241072	Lincoln Property Company 120 N. LaSalle Street, Suite 2900 Chicago, IL 60602	NATIONAL WETLANDS INVENTORY (NWI) MAP	
CREATED BY:	NJB	DATE:	BASE LAYER:	FIGURE:
		10/22/2024	USGS Topographic Map Naperville & Weaton Quadrangles (1993)	
Visio, Vertere, Virtute...	SCALE:		SITE:	5.0
<p>"The Vision To Transform with Excellence"</p>			Plank Road Multifamily Naperville, IL	



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PROJECT NO.:	CLIENT:
241072	Lincoln Property Company
CREATED BY:	120 N. LaSalle Street, Suite 2900
NJB	Chicago, IL 60602
DATE:	BASE LAYER:
10/22/2024	Aerial Imagery (2020)
SCALE:	
See Scale Bar	

**SOIL SURVEY OF DUPAGE COUNTY,
ILLINOIS MAP**

Plank Road Multifamily Naperville, IL

6.0

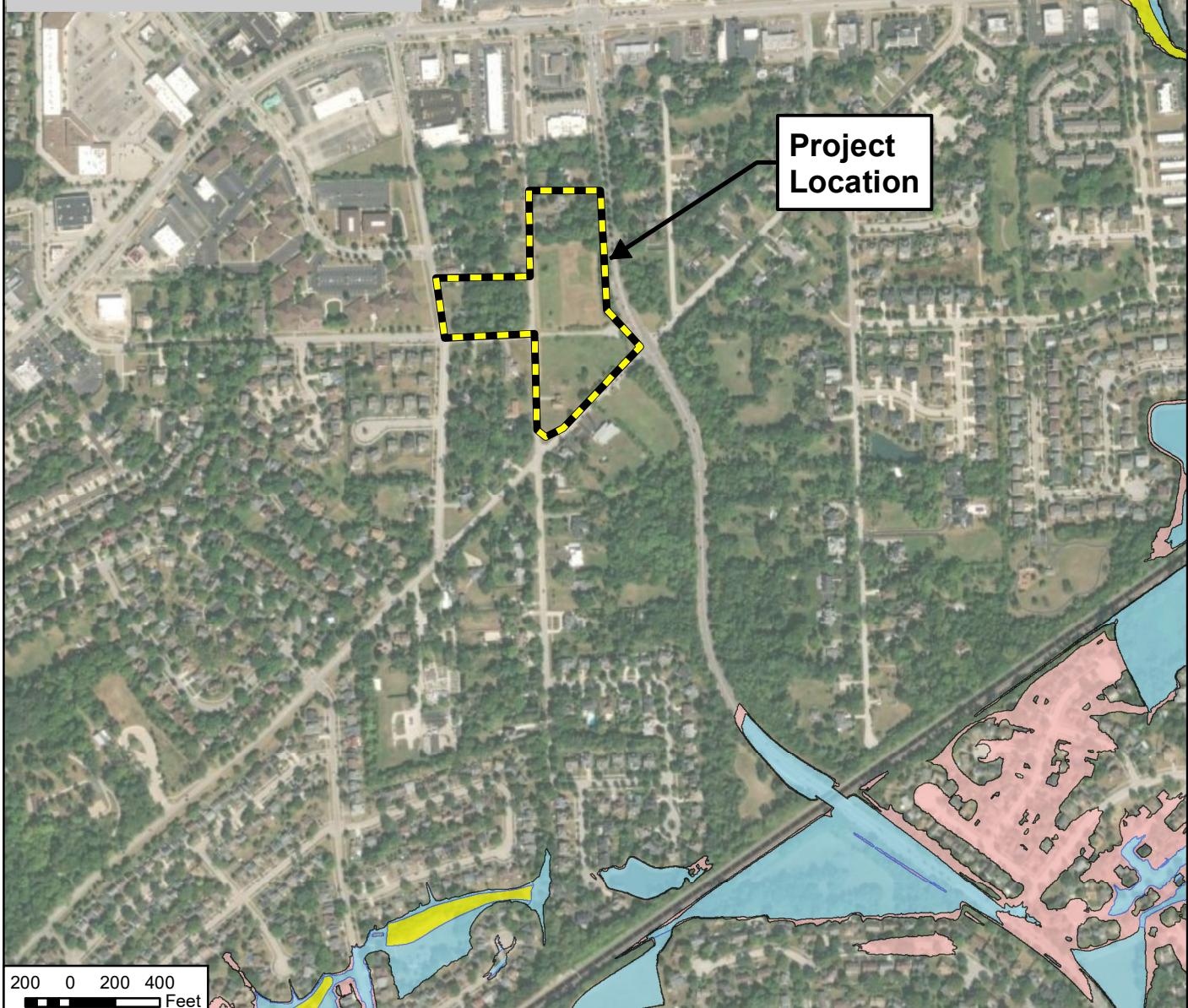


Legend

Flood Zones of DuPage County (2022_02_24)

FLD_ZONE, ZONE_SUBTY

- Zone A
- Zone AE
- Zone AE, Floodway
- Zone AH
- Zone AO
- Open Water
- Zone VE
- Zone X, 0.2% Annual Chance Flood Hazard
- Zone X, Protected By Levee
- Zone X, Depth Less Than 1 ft
- Zone X
- Area Not Included



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Feet



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Lincoln Property Company
120 N. LaSalle Street, Suite 2900
Chicago, IL 60602

CREATED BY:

NJB

DATE:

10/22/2024

BASE LAYER:

Aerial Imagery
(2020)

SCALE:

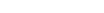
See Scale Bar

FLOOD ZONES OF DUPAGE COUNTY, ILLINOIS MAP

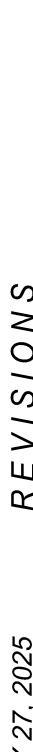
Plank Road Multifamily
Naperville, IL

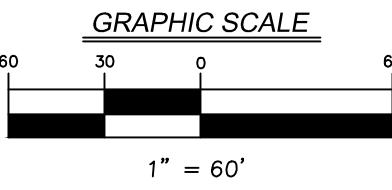
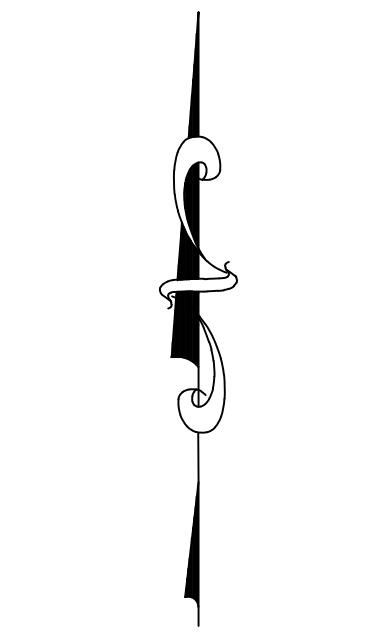
FIGURE:
7.0



LEGEND	
	<u>IMPERVIOUS AREA</u> 16,072 SF (0.37 AC) - 4.6%
	<u>PERVIOUS AREA</u> 335,817 SF (7.71 AC) - 95.4%
TOTAL DISTURBANCE = 351,889 SF (8.08 AC)	

**EXISTING CONDITIONS
IMPERVIOUS EXHIBIT
THE RESIDENCES AT
NAPER AND PLANK**

 <p>EXISTING CONDITIONS IMPERVIOUS EXHIBIT</p>		ORIGINAL ISSUE DATE: FEBRUARY 27, 2025		REVISIONS	
		PROJECT NO.: 241072	NO. DATE	DESCRIPTION	NO. DATE
<p>7325 James Avenue Woodridge, IL 60517 630.724.9200 phone www.v3co.com</p>		PROJECT MANAGER: DF	DESIGNED BY: DF	DRAWN BY: NB	ILLINOIS
<p>THE RESIDENCES AT NAPER AND PLANK</p>					
<p>NAPERVILLE</p>					
<p>DRAWING NO.</p>					
<p>10</p>					



1.0



PROJECT NO.: 24-072		ORIGINAL ISSUE DATE: FEBRUARY 26, 2025		REVISIONS	
PROJECT MANAGER:	DESIGNER:	NO.:	DATE:	DESCRIPTION:	NO.:
DF	DF				

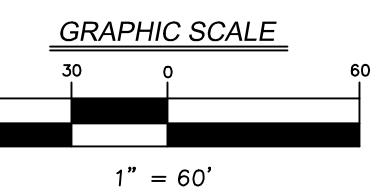
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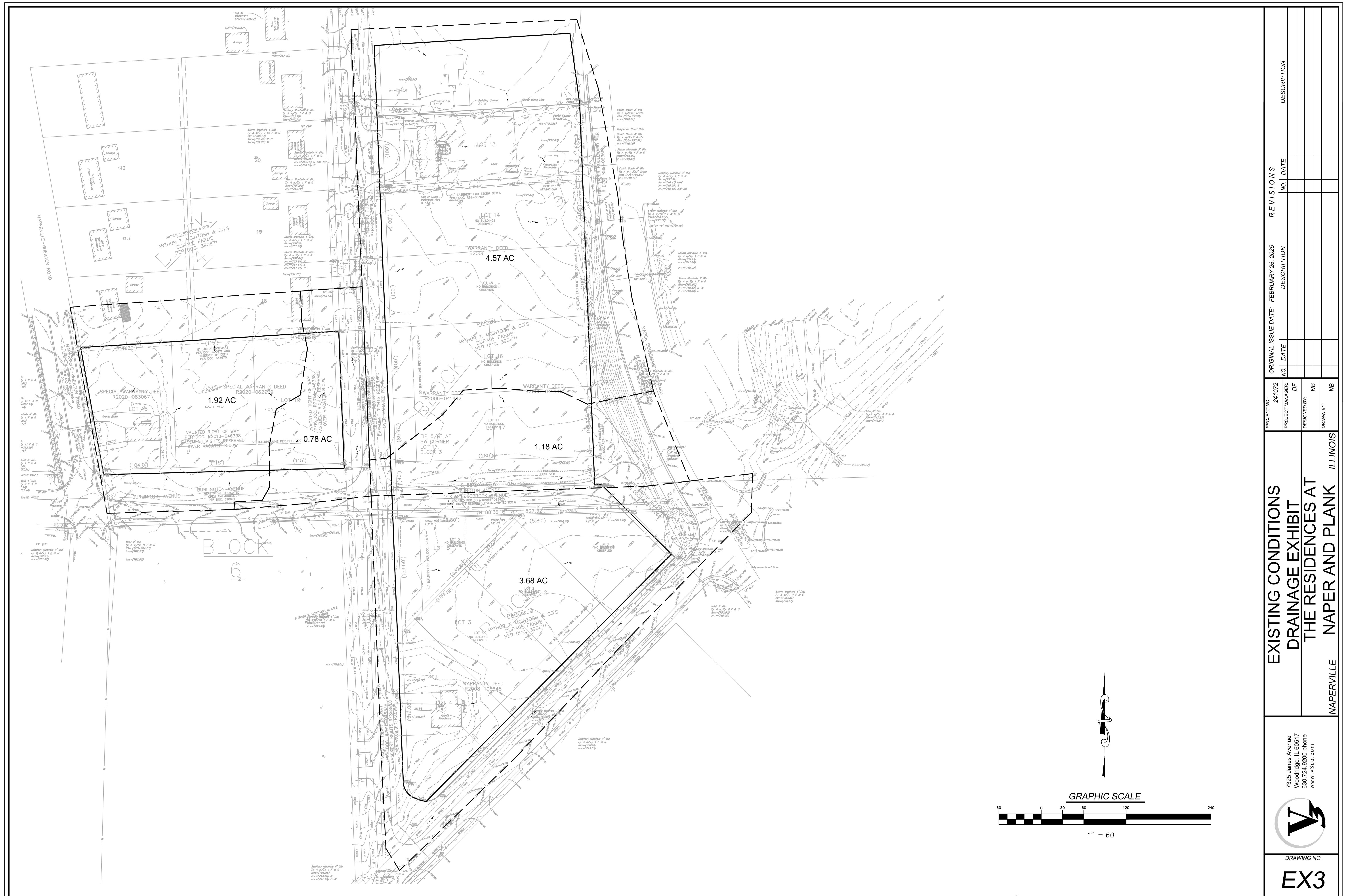
DF NB

**PROPOSED CONDITIONS
IMPERVIOUS EXHIBIT
THE RESIDENCES AT
NAPER AND PLANK
NAPERVILLE ILLINOIS**

7325 Jane Avenue
Woodridge, IL 60517
630/724-3200 phone
www.v3co.com

V3
DRAWING NO.
1.0





EX3

DRAWING NO.

7325 James Avenue
Woodridge, IL 6051
630.724.9200 phon
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CONDITIONS		ORIGINAL ISSUE DATE: FEBRUARY 26, 2025		REVISI ONS	
		NO.	DATE	DESCRIPTION	
PROJECT NO.:	241072				
PROJECT MANAGER:	DF				
DESIGNED BY:	NB				

EXISTING CO DRAINAGE THE RESI

1

Avenue
IL 60517
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7325 Janes
Woodridge,
630.724.9200
www.v3co.

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DRAWING NO.

EX3

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3EX Drainage.dwg Z



PLANK ROAD MULTIFAMILY

NAPERVILLE, IL

HYDROSTOR HS290 STORMWATER CHAMBER SYSTEM

STORMWATER CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE HYDROSTOR HS290 OR APPROVED EQUIVALENT.
2. CHAMBERS SHALL BE MADE FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
5. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-12, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS."
6. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
 - A. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY AASHTO FOR THERMOPLASTIC PIPE.
 - B. A STRUCTURAL EVALUATION SEAL BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO CERTIFY LONG-TERM PERFORMANCE.
- C. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
7. CHAMBERS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

PROJECT INFORMATION:

- PROJECT NUMBER: 24-1100
- PRINSCO SALES CONTACT: Adam Johnson: 331-222-8384
- ENGINEER: ----
- CONTRACTOR: ----
- DISTRIBUTOR: ----

NOTES:

1. PRIOR TO BEGINNING INSTALLATION OF HYDROSTOR STORMWATER CHAMBERS, A PRECONSTRUCTION MEETING SHALL BE HELD WITH A PRINSCO REPRESENTATIVE AND THE INSTALLERS.
2. HYDROSTOR STORMWATER CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE PRINSCO "HYDROSTOR CONSTRUCTION GUIDE".
3. HYDROSTOR STORMWATER CHAMBERS SHALL NOT BE INSTALLED ON WET OR UNSTABLE FOUNDATION OR SUBGRADE. FOUNDATION STONE MUST BE LEVEL AND COMPAKTED.
4. PRINSCO RECOMMENDS PRETREATMENT OF STORMWATER RUNOFF USING A PRINSCO STORMWATER QUALITY UNIT AND/OR A SEDIMENT ROW.
5. MAINTAIN MINIMUM SPACING OF 8.5" (SPECIFICALLY HS290) BETWEEN CHAMBERS.
6. CONSTRUCTION EQUIPMENT SHALL NOT BE SITUATED ATOP THE CHAMBERS UNTIL SUFFICIENT COVER HAS BEEN ACHIEVED. DUMP TRUCKS, RUBBER TIRE LOADERS, EXCAVATORS, WHEEL OR ROLLER LOADS ARE NOT ALLOWED UNTIL PROPER FILL HEIGHTS HAVE BEEN ACHIEVED. REFER TO PRINSCO "HYDROSTOR CONSTRUCTION GUIDE" FOR SPECIFIC LOADING CRITERIA.
7. EMBEDMENT BACKFILL MUST BE PLACED USING THE FOLLOWING METHODS ONLY:
 - BACKFILL WITH AN EXCAVATOR LOCATED OUTSIDE THE EXCAVATION
 - BACKFILL WITH A STONE SHOOTER LOCATED OUTSIDE THE EXCAVATION
 - BACKFILL AS ROWS ARE BUILT WITH AN EXCAVATOR ON THE SUBGRADE OR FOUNDATION STONE
8. EMBEDMENT BACKFILL SHALL NOT BE PLACED USING THE "DUMP AND PUSH" METHOD. THIS MAY CAUSE DAMAGE TO THE CHAMBERS, WILL RESULT IN IMPROPER INSTALLATION AND WILL VOID THE PRINSCO STANDARD WARRANTY.
9. ONCE SUFFICIENT COVER IS ACHIEVED (12" FOR HS290), GRADING MAY COMMENCE WITH A SMALL DOZER OR SKID LOADER (LESS THAN 4.5 PSI GROUND PRESSURE). EQUIPMENT SHALL ALWAYS TRAVEL PARALLEL TO CHAMBER ROWS. SEE PRINSCO "HYDROSTOR CONSTRUCTION GUIDE" FOR SPECIFIC LOADING CRITERIA.

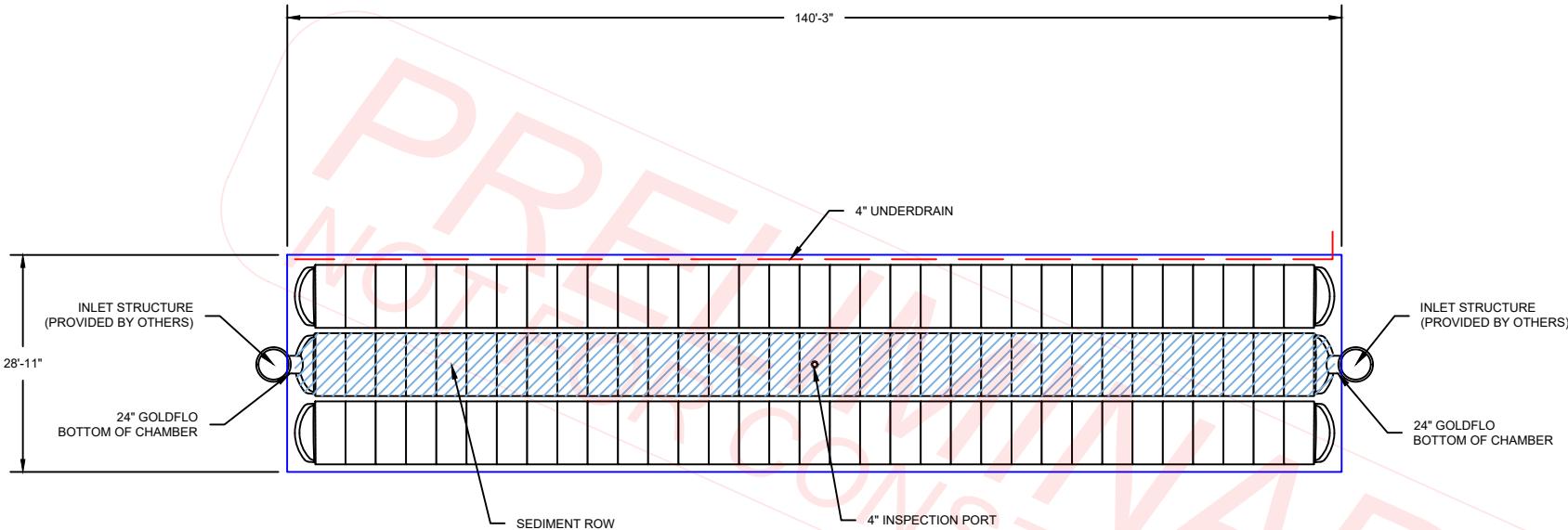
THE UNDERSIGNED HEREBY APPROVES THE ATTACHED (15) PAGES

CUSTOMER

DATE

PRINSCO'S DESIGN ASSUMES 4.4 SOIL BEARING CAPACITY DUE TO UNKNOWN SITE SPECIFIC CONDITIONS. FOUNDATION STONE DEPTH REQUIREMENTS TO BE DETERMINED BY PROJECT ENGINEER BASED ON SOIL BEARING CAPACITY AND COVER HEIGHTS PER PRINSCO DESIGN GUIDE FOUNDATION REQUIREMENTS.

UNDERGROUND DETENTION SYSTEM 1



TOTAL VC STORAGE PROVIDED BELOW 751.50 (ft³): 1,093
 TOTAL DETENTION STORAGE PROVIDED ABOVE 751.50 (ft³): 15,782

BILL OF MATERIALS - SYSTEM 4

PART	DESCRIPTION	QTY.	PART	DESCRIPTION	QTY.
D1	HYDROSTOR HS290 CHAMBER (HS290C)	99	D2	HYDROSTOR HS290 END CAP (HS290E)	4
D3	HYDROSTOR HS290 END CAP w/ 24" CORED HOLE BOTTOM (HS290E-24HB)	2	D4	24GF20NP-WT (FIELD CUT PIPE FOR MANIFOLD)	20'
D5	4" INSPECTION PORT	1	D6	4" UNDERDRAIN (04GF20PF-WT)	140'
D7	4" HDPE 90° ELBOW (E04-90-HIM)	1	D8	4" EXTERNAL END CAP (EC04-BM)	1

THIS DETAIL DEPICTS RECOMMENDED INSTALLATION PRACTICES AND IS NOT INTENDED TO SUPERSEDE ANY NATIONAL, STATE OR LOCAL SPECIFICATIONS. PRINSCO BEARS NO RESPONSIBILITY FOR ANY ALTERATIONS, REVISION AND/OR DEVIATION FROM THIS STANDARD DETAIL. PRINSCO HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICE FOR THIS PROJECT. THE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION TO VERIFY SUITABILITY. © PRINSCO, INC.

TYPICAL ELEVATIONS - HS290 BEDS (ft)

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	764.46
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	758.96
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	758.46
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	758.46
MINIMUM ALLOWABLE GRADE (TOP OF REINFORCED CONCRETE PAVEMENT):	758.46
TOP OF STONE (MN):	757.46
TOP OF CHAMBER:	756.46
24" BOTTOM OF CHAMBER (INVERT):	751.75
BOTTOM OF CHAMBER (MN):	751.50
4" UNDERDRAIN (INVERT):	751.50
BOTTOM OF FOUNDATION STONE:	750.75

PROPOSED SYSTEM LAYOUT HS290

INSTALLED SYSTEM VOLUME (ft ³):	16,875
VOLUME CALCULATED WITH 36% STONE VOID SPACE	
INSTALLED SYSTEM FOOTPRINT (ft ²):	4,049
SYSTEM PERIMETER (ft):	338
TOTAL CHAMBERS:	99
TOTAL END CAPS:	6
STONE REQUIRED (yd ³):	595
NON-WOVEN GEOTEXTILE (yd ²):	1,382
WOVEN GEOTEXTILE (yd ²):	150



1717 16TH ST. NE
 WILLMAR, MN 56201
www.prinSCO.com

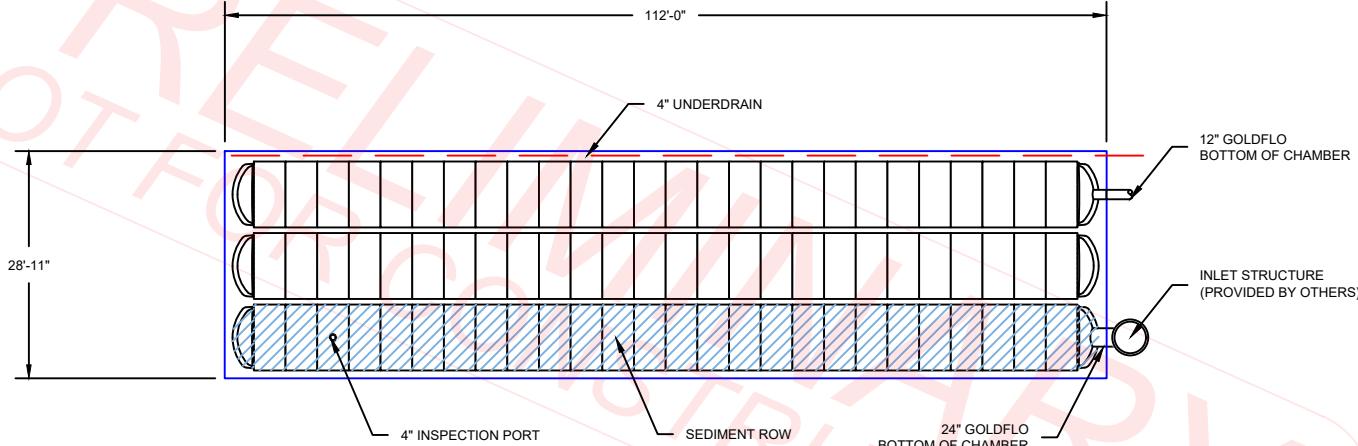
TITLE: PLANK ROAD MULTIFAMILY
 NAPERVILLE, IL

REV: B

CHECKED BY: TJW PRINSCO SALES CONTACT: Adam Johnson: 331-222-8384
 DRAWN BY: ZWC DATE: 13-Jan-25 DRAWING NUMBER:
 SCALE: NTS SHEET: 4 OF 9

PRINSCO'S DESIGN ASSUMES 4.4 SOIL BEARING CAPACITY DUE TO UNKNOWN SITE SPECIFIC CONDITIONS. FOUNDATION STONE DEPTH REQUIREMENTS TO BE DETERMINED BY PROJECT ENGINEER BASED ON SOIL BEARING CAPACITY AND COVER HEIGHTS PER PRINSCO DESIGN GUIDE FOUNDATION REQUIREMENTS.

UNDERGROUND DETENTION SYSTEM 2



BILL OF MATERIALS - SYSTEM 3

PART	DESCRIPTION	QTY.	PART	DESCRIPTION	QTY.
C1	HYDROSTOR HS290 CHAMBER (HS290C)	78	C2	HYDROSTOR HS290 END CAP (HS290E)	4
C3	HYDROSTOR HS290 END CAP w/ 24" CORED HOLE BOTTOM (HS290E-24HB)	1	C4	24GF20NP-WT (FIELD CUT PIPE FOR MANIFOLD)	20'
C5	HYDROSTOR HS290 END CAP w/ 12" CORED HOLE BOTTOM (HS290E-12HB)	1	C6	12GF20NP-WT (FIELD CUT PIPE FOR MANIFOLD)	20'
C7	4" INSPECTION PORT	1	C8	4" UNDERDRAIN (04GF20PF-WT)	120'
C9	4" EXTERNAL END CAP (EC04-BM)	1			

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TYPICAL ELEVATIONS - HS290 BEDS (ft)

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	764.46
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	758.96
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	758.46
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	758.46
MINIMUM ALLOWABLE GRADE (TOP OF REINFORCED CONCRETE PAVEMENT):	758.46
TOP OF STONE (MN):	757.46
TOP OF CHAMBER:	756.46
24" BOTTOM OF CHAMBER (INVERT):	751.75
12" BOTTOM OF CHAMBER (INVERT):	751.68
BOTTOM OF CHAMBER (MN):	751.50
4" UNDERDRAIN (INVERT):	751.50
BOTTOM OF FOUNDATION STONE:	750.75

PROPOSED SYSTEM LAYOUT HS290

INSTALLED SYSTEM VOLUME (ft ³):	13,437
VOLUME CALCULATED WITH 36% STONE VOID SPACE	
SYSTEM FOOTPRINT (ft ²):	3,235
SYSTEM PERIMETER (ft):	282
TOTAL CHAMBERS:	78
TOTAL END CAPS:	6
TOTAL LENGTH:	1,115
STONE REQUIRED (yd ³):	478
NON-WOVEN GEOTEXTILE (yd ²):	120
WOVEN GEOTEXTILE (yd ²):	120

TOTAL VC STORAGE PROVIDED BELOW 751.50 (ft³): 873
TOTAL DETENTION STORAGE PROVIDED ABOVE 751.50 (ft³): 12,564



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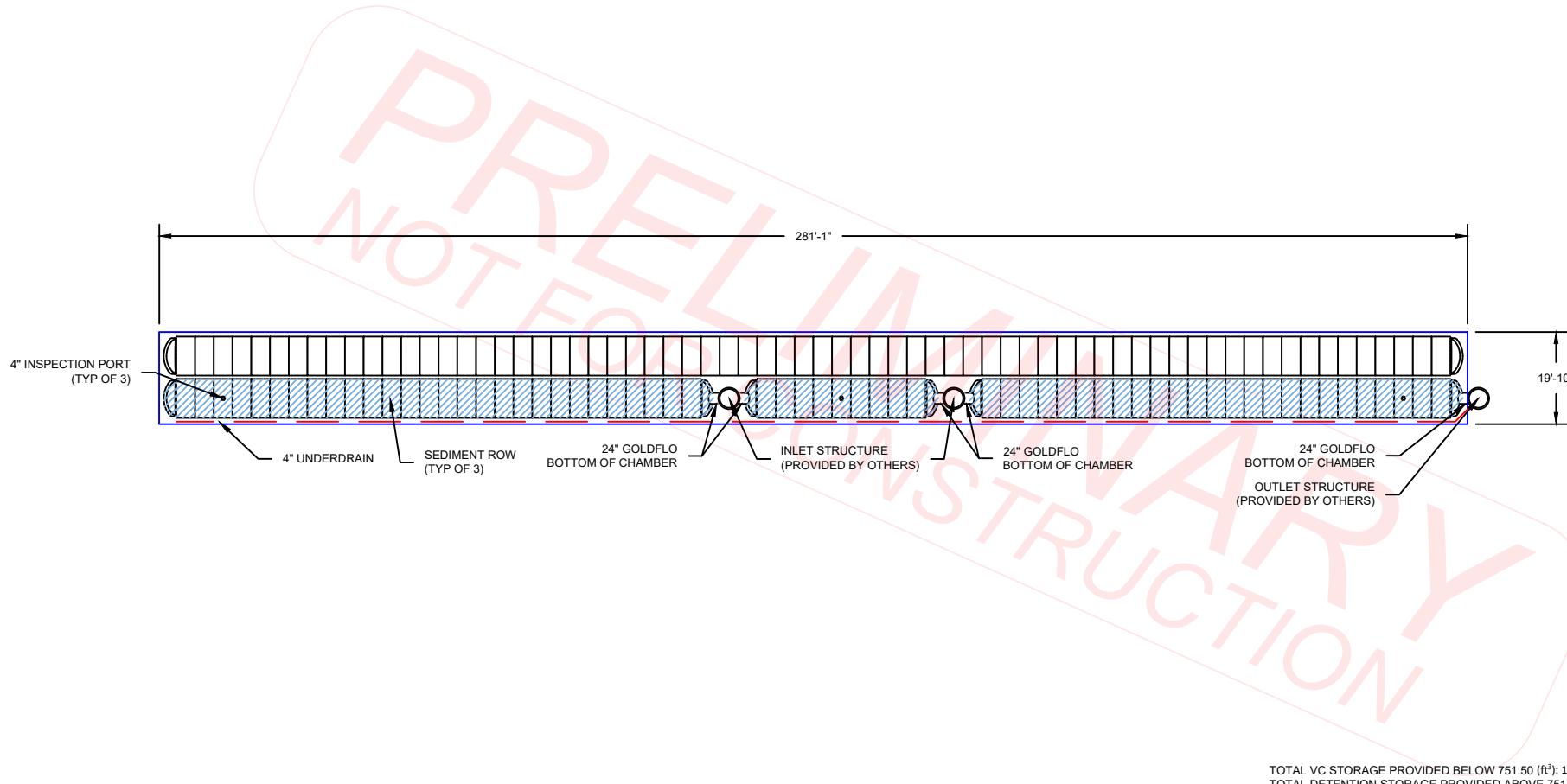
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UNDERGROUND DETENTION SYSTEM 3



BILL OF MATERIALS - SYSTEM 2

PART	DESCRIPTION	QTY.	PART	DESCRIPTION	QTY.
B1	HYDROSTOR HS290 CHAMBER (HS290C)	130	B2	HYDROSTOR HS290 END CAP (HS290E)	3
B3	HYDROSTOR HS290 END CAP w/ 24" CORED HOLE BOTTOM (HS290E-24HB)	5	B4	24GF20NP-WT (FIELD CUT PIPE FOR MANIFOLD)	20'
B5	4" UNDERDRAIN (04GF20PF-WT)	300'	B6	4" EXTERNAL END CAP (EC04-BM)	1
B7	4" HDPE 45° ELBOW (E04-45-HIM)	1	B8	4" INSPECTION PORT	3

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TYPICAL ELEVATIONS S - HS290 BEDS (R)

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	754.46	INSTALLED SYSTEM VOLUME (ft ³):	22,787
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	758.96	VOLUME CALCULATED WITH 36% STONE VOID SPACE	
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	758.46	INSTALLED SYSTEM FOOTPRINT (ft ²):	5,563
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	758.46	SYSTEM PERIMETER (ft):	602
MINIMUM ALLOWABLE GRADE (TOP OF REINFORCED CONCRETE PAVEMENT):	758.46	TOTAL CHAMBERS:	130
TOP OF STONE (MIN):	757.46	TOTAL END CAPS:	8
TOP OF CHAMBER:	756.46	BOTTOM OF CHAMBER (INVERT):	751.75
24" BOTTOM OF CHAMBER (INVERT):	756.46	STONE REQUIRED (yd ³):	840
BOTTOM OF CHAMBER (MIN):	751.50	NON-WOVEN GEOTEXTILE (yd ²):	2,022
4" UNDERDRAIN (INVERT):	751.50	WOVEN GEOTEXTILE (yd ²):	288
BOTTOM OF FOUNDATION STONE:	750.75		

PROPOSED SYSTEM LAYOUT HS290

INSTALLED SYSTEM VOLUME (ft ³):	22,787
VOLUME CALCULATED WITH 36% STONE VOID SPACE	
INSTALLED SYSTEM FOOTPRINT (ft ²):	5,563
SYSTEM PERIMETER (ft):	602
TOTAL CHAMBERS:	130
TOTAL END CAPS:	8
BOTTOM OF CHAMBER (INVERT):	751.75
STONE REQUIRED (yd ³):	840
NON-WOVEN GEOTEXTILE (yd ²):	2,022
WOVEN GEOTEXTILE (yd ²):	288



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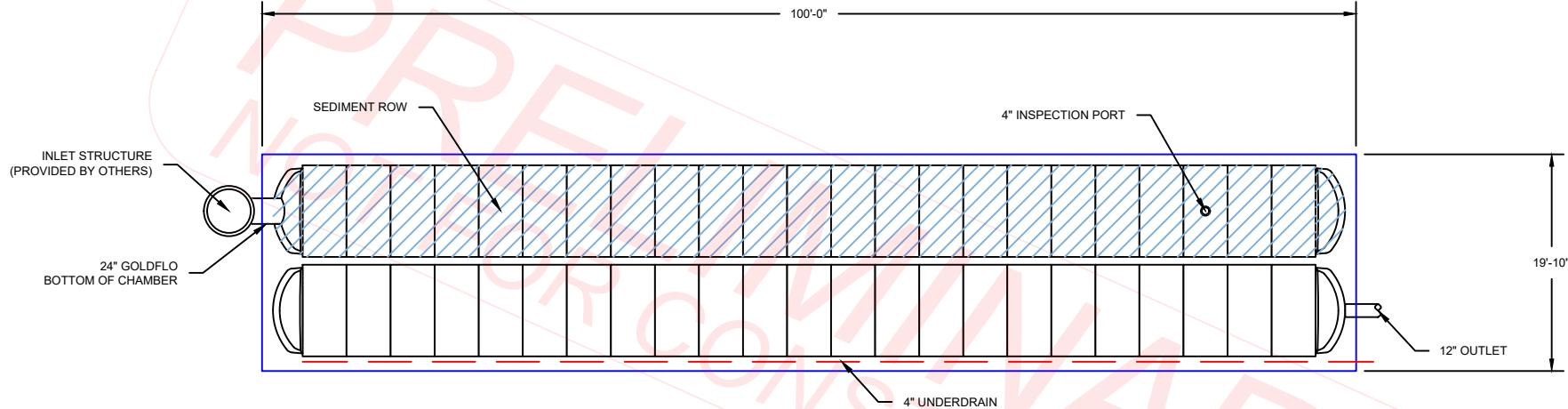
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UNDERGROUND DETENTION SYSTEM 4



TOTAL VC STORAGE PROVIDED BELOW 749.00 (ft³): 534
 TOTAL DETENTION STORAGE PROVIDED ABOVE 749.00 (ft³): 7,572

BILL OF MATERIALS - SYSTEM 6

PART	DESCRIPTION	QTY.	PART	DESCRIPTION	QTY.
F1	HYDROSTOR HS290 CHAMBER (HS290C)	46	F2	HYDROSTOR HS290 END CAP (HS290E)	3
F3	HYDROSTOR HS290 END CAP w/ 24" CORED HOLE BOTTOM (HS290E-24HB)	1	F4	24GF20NP-WT (FIELD CUT PIPE FOR MANIFOLD)	20'
F5	4" INSPECTION PORT	1	F6	4" UNDERDRAIN (04GF20PF-WT)	100'
F7	4" EXTERNAL END CAP (EC04-BM)	1			

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TYPICAL ELEVATIONS - HS290 BEDS (ft)

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	761.96
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	756.46
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	755.96
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	755.96
MINIMUM ALLOWABLE GRADE (TOP OF REINFORCED CONCRETE PAVEMENT):	755.96
TOP OF STONE (MN):	754.96
TOP OF CHAMBER:	753.96
24" BOTTOM OF CHAMBER (INVERT):	749.25
BOTTOM OF CHAMBER (MN):	749.00
4" UNDERDRAIN (INVERT):	749.00
BOTTOM OF FOUNDATION STONE:	748.25

PROPOSED SYSTEM LAYOUT HS290

INSTALLED SYSTEM VOLUME (ft ³):	8,106
VOLUME CALCULATED WITH 36% STONE VOID SPACE	
INSTALLED SYSTEM FOOTPRINT (ft ²):	1,979
SYSTEM PERIMETER (ft):	240
TOTAL CHAMBERS:	46
TOTAL END CAPS:	4
STONE REQUIRED (yd ³):	299
NON-WOVEN GEOTEXTILE (yd ²):	742
WOVEN GEOTEXTILE (yd ²):	106



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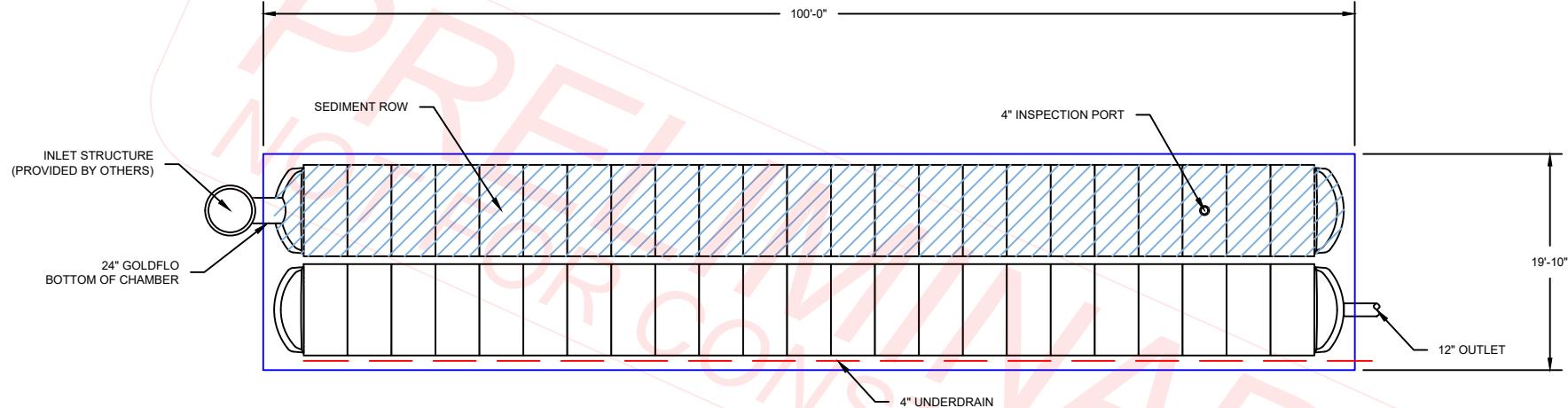
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UNDERGROUND DETENTION SYSTEM 5



TOTAL VC STORAGE PROVIDED BELOW 749.00 (ft³): 534
 TOTAL DETENTION STORAGE PROVIDED ABOVE 749.00 (ft³): 7,572

BILL OF MATERIALS - SYSTEM 7

PART	DESCRIPTION	QTY.	PART	DESCRIPTION	QTY.
G1	HYDROSTOR HS290 CHAMBER (HS290C)	46	G2	HYDROSTOR HS290 END CAP (HS290E)	3
G3	HYDROSTOR HS290 END CAP w/ 24" CORED HOLE BOTTOM (HS290E-24HB)	1	G4	24GF20NP-WT (FIELD CUT PIPE FOR MANIFOLD)	20'
G5	4" INSPECTION PORT	1	G6	4" UNDERDRAIN (04GF20PF-WT)	100'
G7	4" EXTERNAL END CAP (EC04-BM)	1			

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TYPICAL ELEVATIONS - HS290 BEDS (ft)

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	761.96
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	756.46
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	755.96
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	755.96
MINIMUM ALLOWABLE GRADE (TOP OF REINFORCED CONCRETE PAVEMENT):	755.96
TOP OF STONE (MN):	754.96
TOP OF CHAMBER:	753.96
24" BOTTOM OF CHAMBER (INVERT):	749.25
BOTTOM OF CHAMBER (MN):	749.00
4" UNDERDRAIN (INVERT):	749.00
BOTTOM OF FOUNDATION STONE:	748.25

PROPOSED SYSTEM LAYOUT HS290

INSTALLED SYSTEM VOLUME (ft ³):	8,106
VOLUME CALCULATED WITH 36% STONE VOID SPACE	
INSTALLED SYSTEM FOOTPRINT (ft ²):	1,979
SYSTEM PERIMETER (ft):	240
TOTAL CHAMBERS:	46
TOTAL END CAPS:	4
STONE REQUIRED (yd ³):	299
NON-WOVEN GEOTEXTILE (yd ²):	742
WOVEN GEOTEXTILE (yd ²):	106



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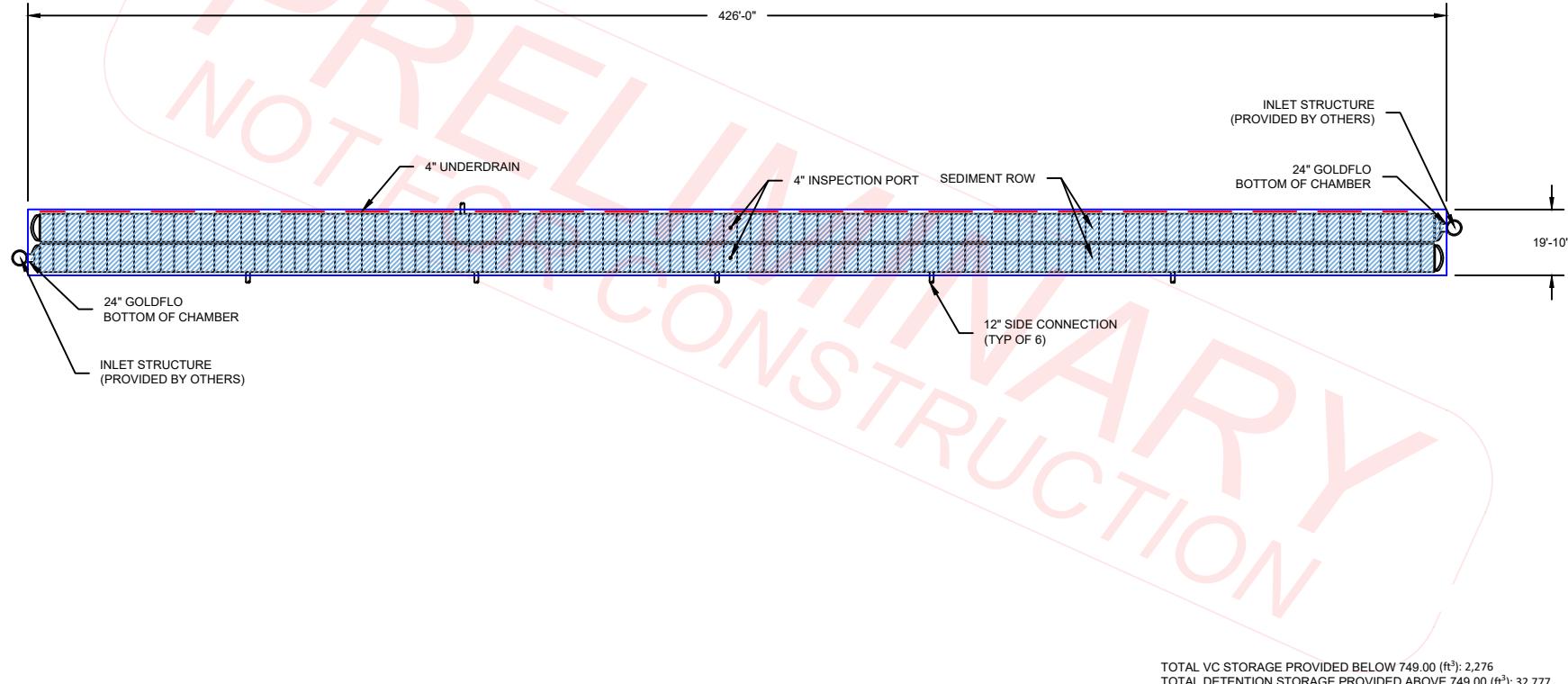
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UNDERGROUND DETENTION SYSTEM 6



BILL OF MATERIALS - SYSTEM 1

PART	DESCRIPTION	QTY.	PART	DESCRIPTION	QTY.
A1	HYDROSTOR HS290 CHAMBER (HS290C)	208	A2	HYDROSTOR HS290 END CAP (HS290E)	2
A3	HYDROSTOR HS290 END CAP w/ 24" CORED HOLE BOTTOM (HS290E-24HB)	2	A4	24GF20NP-WT (FIELD CUT PIPE FOR MANIFOLD)	20'
A5	4" UNDERDRAIN (04GF20PF-WT)	440'	A6	4" EXTERNAL END CAP (EC04-BM)	2
A7	4" INSPECTION PORT	2			

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TYPICAL ELEVATION S - HS290 BEDS (R)

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	761.96
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	756.46
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	755.96
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	755.96
MINIMUM ALLOWABLE GRADE (TOP OF REINFORCED CONCRETE PAVEMENT):	755.96
TOP OF STONE (MIN):	754.96
TOP OF CHAMBER:	753.96
24" BOTTOM OF CHAMBER (INVERT):	749.25
BOTTOM OF CHAMBER (MIN):	749.00
4" UNDERDRAIN (INVERT):	749.00
BOTTOM OF FOUNDATION STONE:	748.25

PROPOSED SYSTEM LAYOUT HS290

INSTALLED SYSTEM VOLUME (ft ³):	35,053
VOLUME CALCULATED WITH 36% STONE VOID SPACE	
INSTALLED SYSTEM FOOTPRINT (ft ²):	8,431
SYSTEM PERIMETER (ft):	892
TOTAL CHAMBERS:	208
TOTAL END CAPS:	4
STONE REQUIRED (yd ³):	1,245
NON-WOVEN GEOTEXTILE (yd ²):	3,046
WOVEN GEOTEXTILE (yd ²):	919

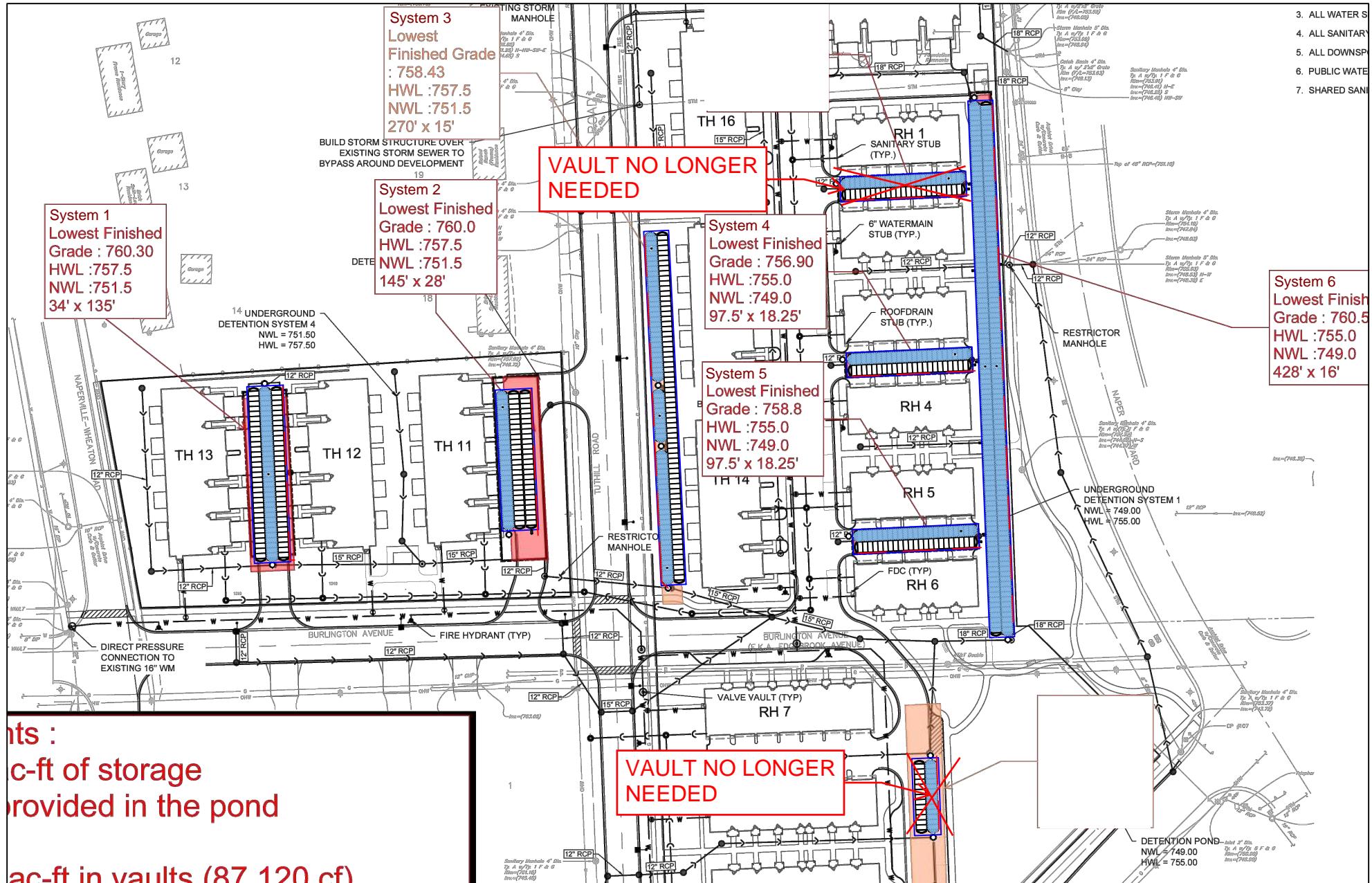


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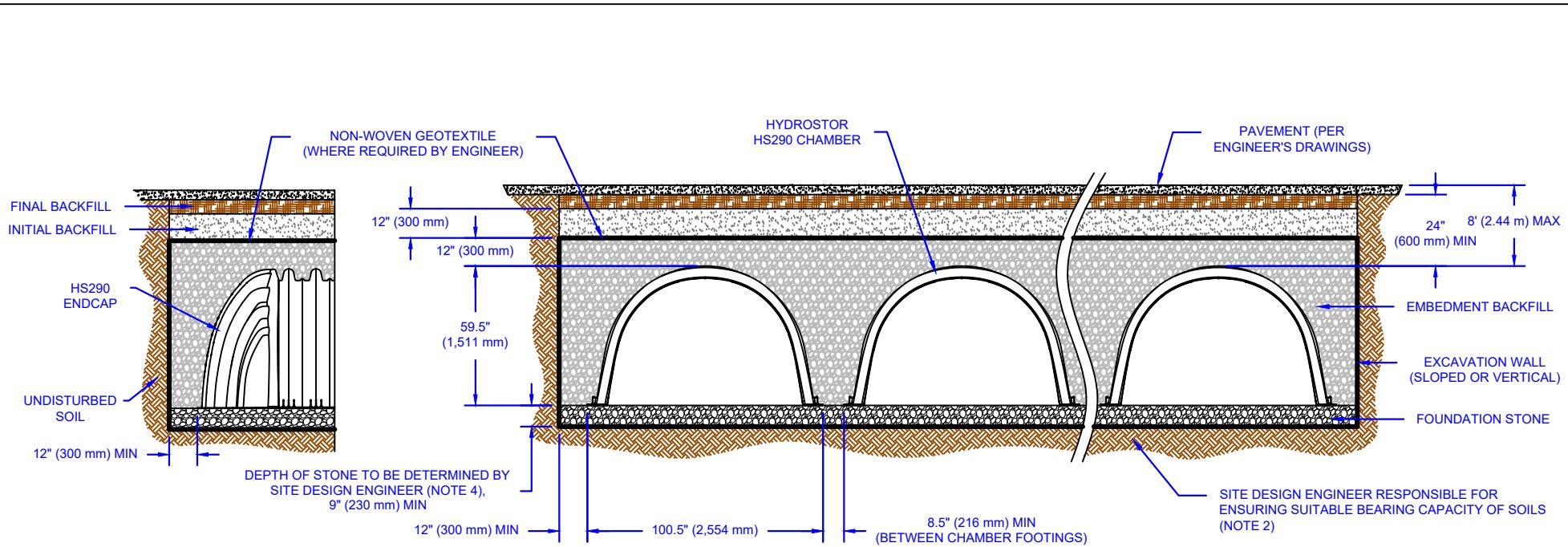
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OVERLAY

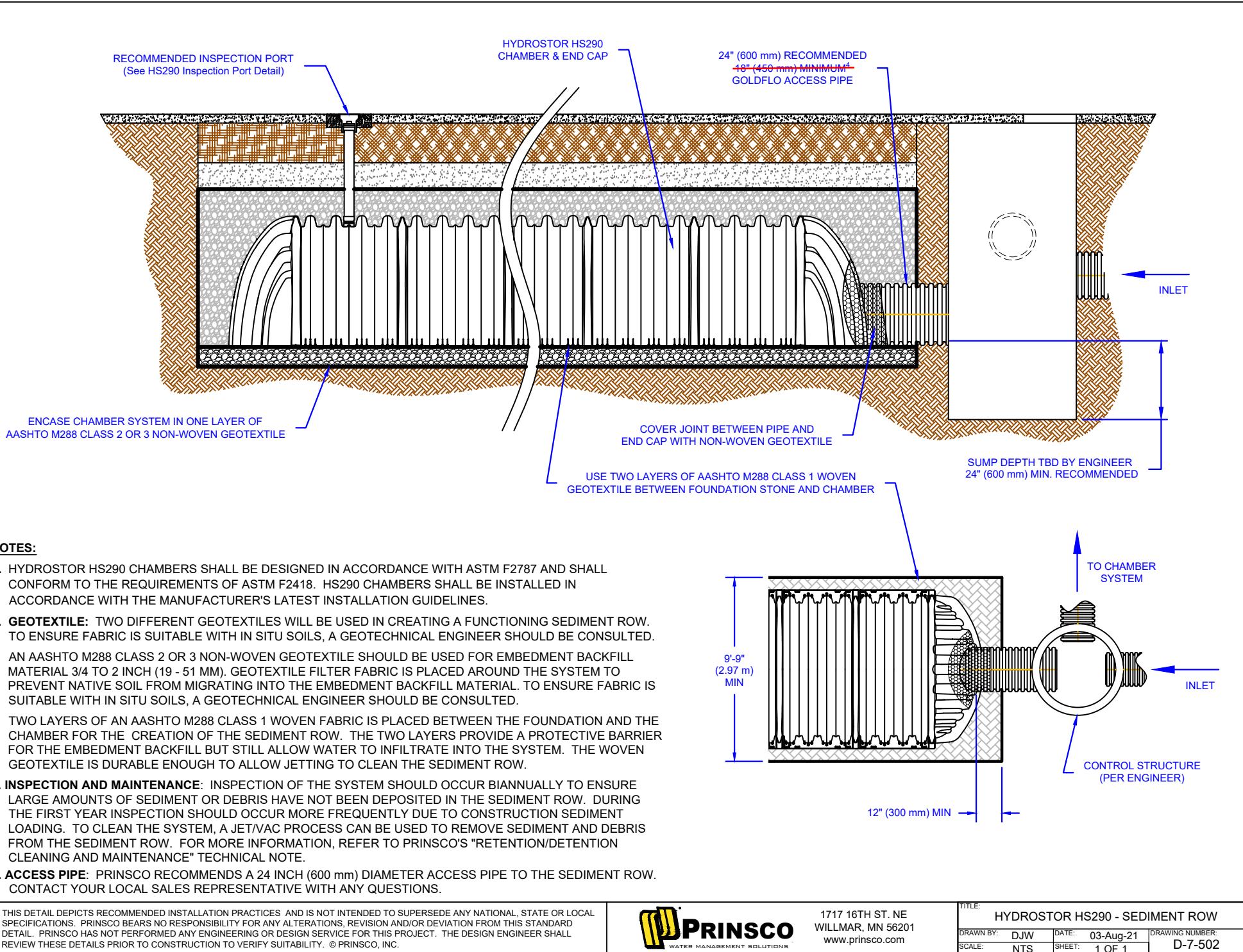
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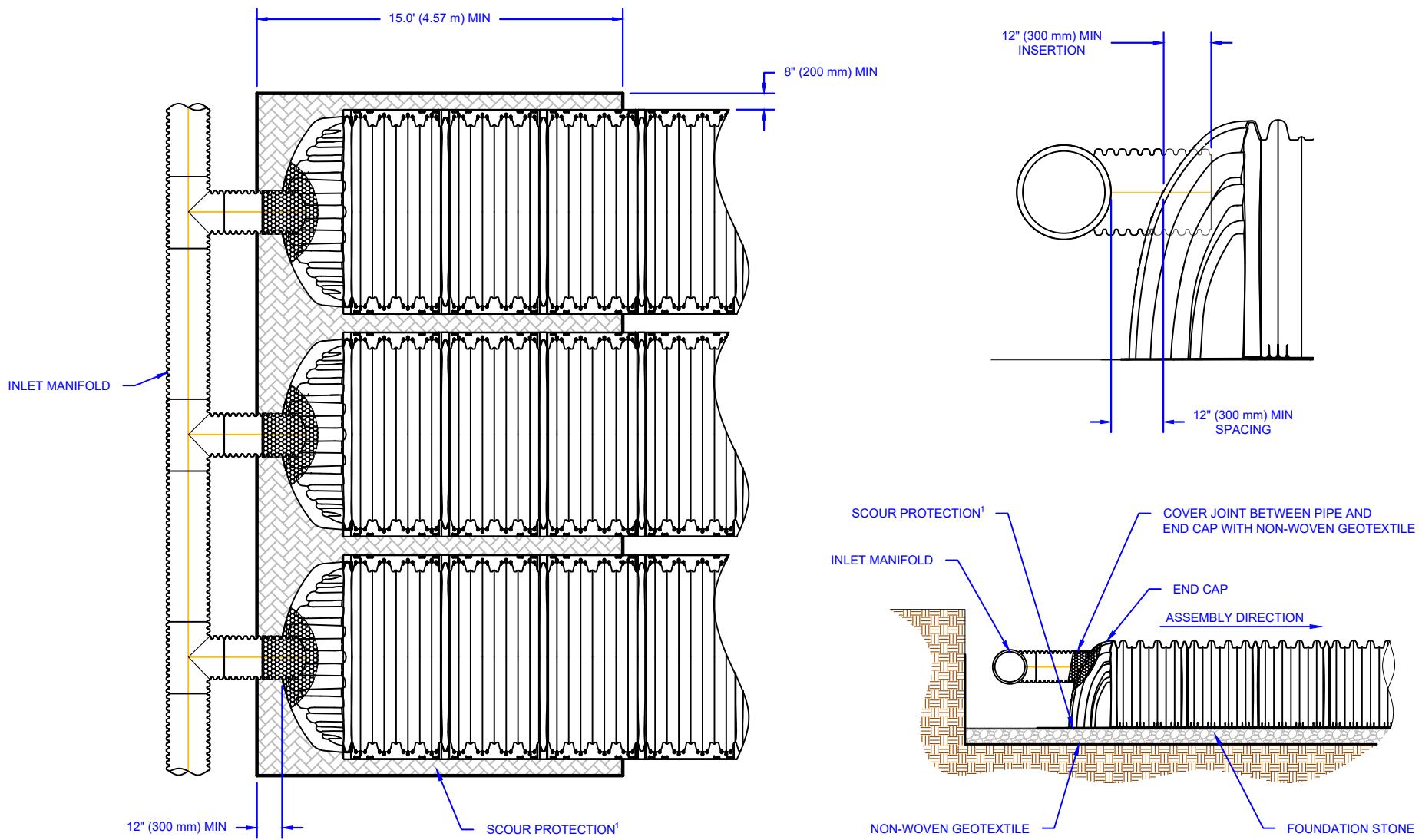


NOTES:

1. HYDROSTOR HS290 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418. HS180 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S LATEST INSTALLATION GUIDELINES.
2. **SUBGRADE:** TRENCH BOTTOMS WITH UNSTABLE OR UNYIELDING MATERIAL SHALL BE EXCAVATED TO A DEPTH DIRECTED BY THE ENGINEER AND REPLACED WITH SUITABLE MATERIAL. FOR UNSTABLE MATERIALS, GEOTEXTILE MAY BE USED TO STABILIZE THE TRENCH BOTTOM, IF DIRECTED BY THE ENGINEER. THE DESIGN ENGINEER IS RESPONSIBLE FOR VERIFYING SUBGRADE SUITABILITY WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
3. **GEOTEXTILE:** AN AASHTO M288 CLASS 2 OR 3 NON-WOVEN GEOTEXTILE SHOULD BE USED FOR EMBEDMENT BACKFILL MATERIAL 3/4 TO 2 INCH (19 - 51 MM). GEOTEXTILE FILTER FABRIC IS PLACED AROUND THE SYSTEM TO PREVENT NATIVE SOIL FROM MIGRATING INTO THE EMBEDMENT BACKFILL MATERIAL. TO ENSURE FABRIC IS SUITABLE WITH IN SITU SOILS, A GEOTECHNICAL ENGINEER SHOULD BE CONSULTED.
4. **FOUNDATION STONE:** SUITABLE MATERIAL SHALL BE A 3/4 - 2 INCH (19 - 51 mm), CLEAN, CRUSHED ANGULAR STONE, OR AASHTO M43 SIZES (3, 357, 4, 467, 5, 56, 57) WITH CLEAN, CRUSHED, ANGULAR STONE ADDED TO THE GRADATION, e.g., CLEAN, CRUSHED, ANGULAR #3 (AASHTO M43) STONE. COMPACTION SHOULD BE DONE IN LIFTS OF NO MORE THAN 9 INCHES (230 mm). THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE ALLOWABLE BEARING CAPACITY OF THE SUBGRADE SOIL AND DETERMINING THE FOUNDATION STONE THICKNESS. REFER TO PRINSO'S HYDROSTOR DESIGN GUIDE SECTION 4.1 FOR ADDITIONAL GUIDANCE.
5. **EMBEDMENT BACKFILL:** SUITABLE MATERIAL SHALL BE A 3/4 - 2 INCH (19 - 51 mm), CLEAN, CRUSHED ANGULAR STONE, OR AASHTO M43 SIZES (3, 357, 4, 467, 5, 56, 57) WITH CLEAN, CRUSHED, ANGULAR STONE ADDED TO THE GRADATION, e.g., CLEAN, CRUSHED, ANGULAR #3 (AASHTO M43) STONE. EMBEDMENT BACKFILL SHALL EXTEND FROM TOP OF BEDDING TO NOT LESS THAN 12 INCHES (300 mm) ABOVE THE TOP OF THE CHAMBER. NO COMPACTION IS REQUIRED BUT AN EFFORT SHOULD BE MADE TO HAND KNIFE STONE IN BETWEEN ALL CORRUGATIONS.
6. **INITIAL BACKFILL:** SUITABLE MATERIAL SHALL BE A GRANULAR, WELL GRADED SOIL WITH LESS THAN 35% FINES OR AASHTO M43 SIZES (3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10). MOST PAVEMENT SUBBASE MATERIALS FALL WITHIN THIS GRADING CRITERIA. INITIAL BACKFILL SHALL EXTEND FROM TOP OF EMBEDMENT BACKFILL TO NOT LESS THAN 24 INCHES (600 mm) ABOVE THE TOP OF THE CHAMBER. COMPACT TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY.
7. **FINAL BACKFILL:** SUITABLE MATERIALS SHALL BE ANY SOIL DIRECTED BY THE ENGINEER. FINAL BACKFILL SHALL EXTEND FROM TOP OF INITIAL BACKFILL TO NO MORE THAN 8 FEET (2.44 m) ABOVE THE TOP OF THE CHAMBER. COMPACTION LEVELS SHOULD FOLLOW ENGINEERS RECOMMENDATIONS.
8. **MINIMUM COVER:** FOR TRAFFIC APPLICATIONS A MINIMUM COVER OF 24 INCHES (600 mm) IS REQUIRED, MEASURED FROM THE TOP OF THE CHAMBER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR TO THE TOP OF RIGID PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING MAY OCCUR, INCREASE COVER TO 30 INCHES (750 mm) FOR H-20 LOADING. ADDITIONAL COVER MAY BE REQUIRED FOR CONSTRUCTION LOADS.
9. **MAXIMUM COVER:** A COVER HEIGHT OF OVER 8 FEET (2.44 m) IS NOT RECOMMENDED. COVER HEIGHT IS MEASURED FROM THE TOP OF THE CHAMBER TO THE TOP OF THE PAVEMENT.
10. **LOAD RATING:** HS290 CHAMBERS ARE TRAFFIC RATED FOR H-20 VEHICLES WITH ADDITIONAL CONSIDERATION FOR LANE LOADING, COMMONLY REFERRED TO AS HL-93 LOAD RATING (AASHTO DESIGN TRUCK).

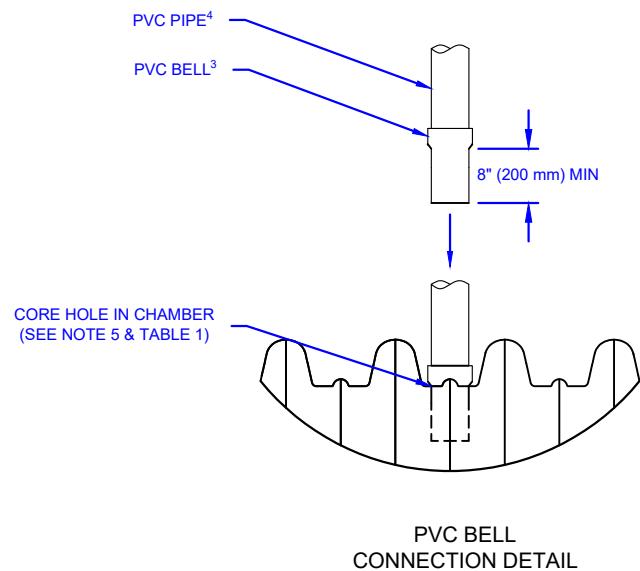
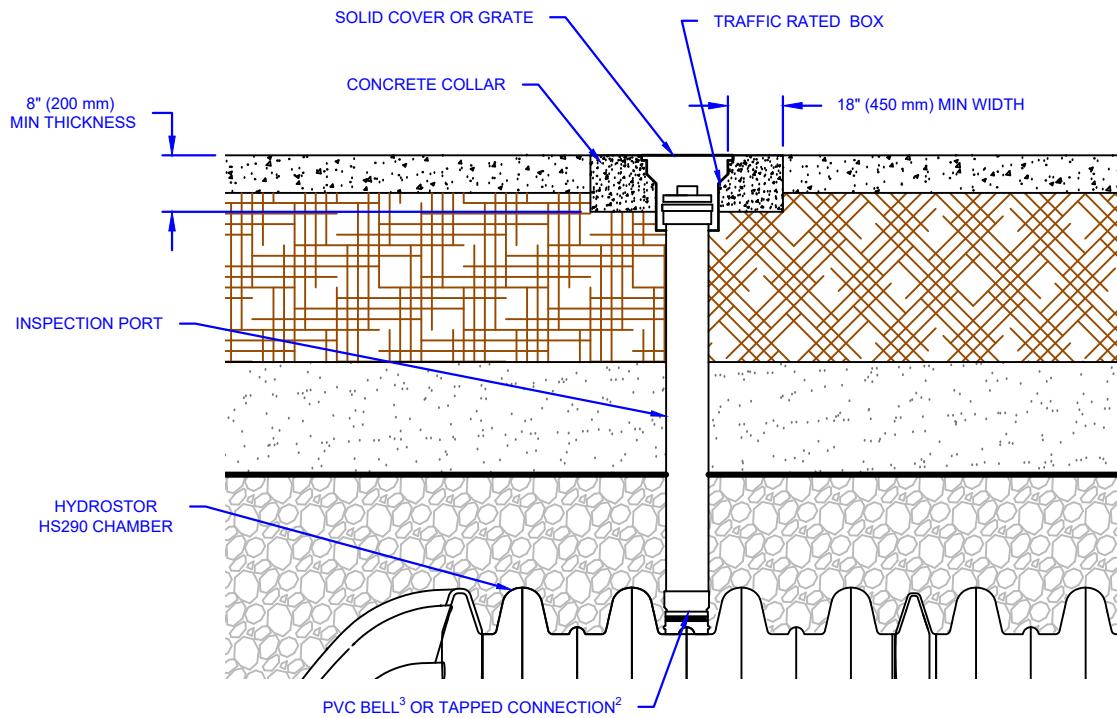
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NOTES:

1. SCOUR PROTECTION SHOULD USE A WOVEN GEOTEXTILE.
GEOTEXTILE SHOULD MEET AASHTO M288 CLASS 1 SPECIFICATION.
2. SCOUR PROTECTION IS ONLY NEEDED WITH CHAMBER ROWS CONNECTED TO
THE INLET MANIFOLD.



NOTES:

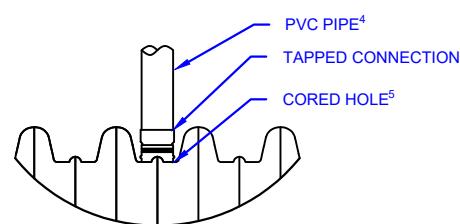
1. REFER TO TABLE 1 FOR DETAILS.
2. TAPPED CONNECTION CAN CONSIST OF QWIKSEAL OR APPROVED ENGINEERING EQUIVALENT.
3. PVC FITTING CAN CONSIST OF BELL OR OTHER CONNECTION WHICH PREVENTS PIPE FROM SLIDING INTO THE CHAMBER. ALL PVC FITTINGS TO BE SOLVENT CEMENTED.
4. PVC MAY BE EITHER SDR 35 OR SCH 40.
5. HOLES SHOULD BE CUT WITH A HOLE SAW, ALTHOUGH A RECIPROCATING SAW MAY BE NEEDED FOR 6" AND 8" HOLES ON THIS CHAMBER. IF NEEDED, START WITH SMALLER HOLE AND SLOWLY CUT OUT MORE EVENLY FROM SIDES UNTIL TIGHT FIT OF CONNECTION IN HOLE.

TABLE 1

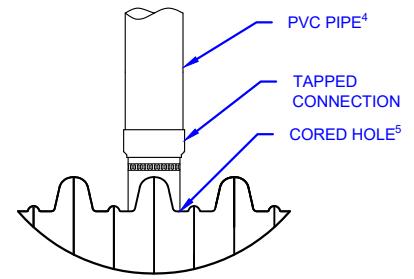
CORED HOLE SIZE ESTIMATES (CONFIRM DIMENSIONS PRIOR TO CUTTING)			
CONNECTION	4" (100 mm) PVC INSPECTION PORT	6" (150 mm) PVC INSPECTION PORT	8" (200 mm) PVC INSPECTION PORT
QWIKSEAL	5" (125 mm) hole centered in valley of corrugation.	Not Recommended	Not Recommended
SDR 35*	~4-1/4" (108 mm) hole centered in valley of corrugation.	~6-3/8" (162 mm) hole centered in valley of corrugation.	~8-1/2" (216 mm) hole centered on corrugation crest.
SCH 40*	~4-5/8" (117 mm) hole centered in valley of corrugation.	~6-3/4" (172 mm) hole centered in valley of corrugation.	~8-3/4" (222 mm) hole centered on corrugation crest.

*CONFIRM O.D. OF PIPE PRIOR TO CUTTING TO ENSURE HOLE IS TIGHT FITTING AROUND PVC PIPE. CUT HOLE TO MATCH O.D. AS CLOSE AS POSSIBLE.

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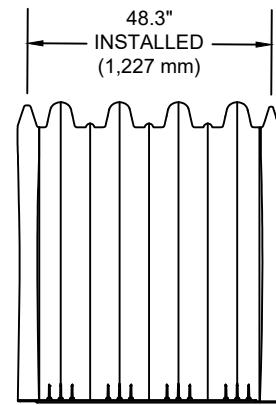
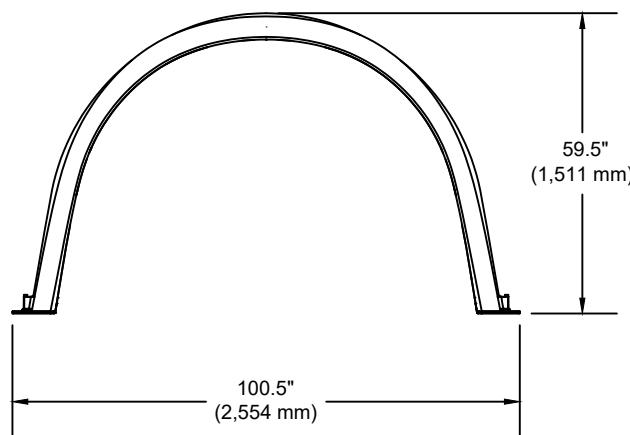
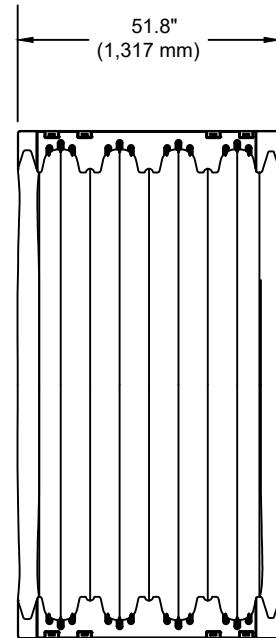


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CORRUGATION
CONNECTION DETAIL

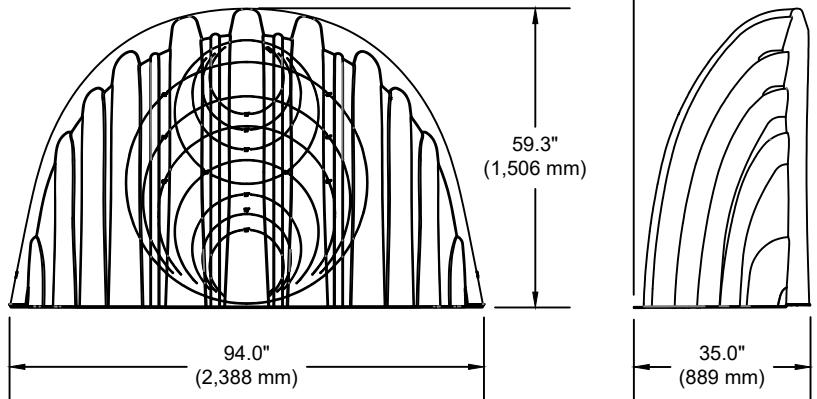


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Chamber Specifications	
Chamber Size (L x W x H)	51.8" x 100.5" x 59.5" (1,317 x 2,554 x 1,511 mm)
Installed Length	48.3" (1,227 mm)
Chamber Storage	109.6 ft ³ (3.10 m ³)
Min. Installed Storage*	164.5 ft ³ (4.66 m ³)
Weight / Chamber	112 lbs (50.80 kg)
Chambers / Pallet	10
Approx. Weight / Pallet	1,350 lbs (612 kg)

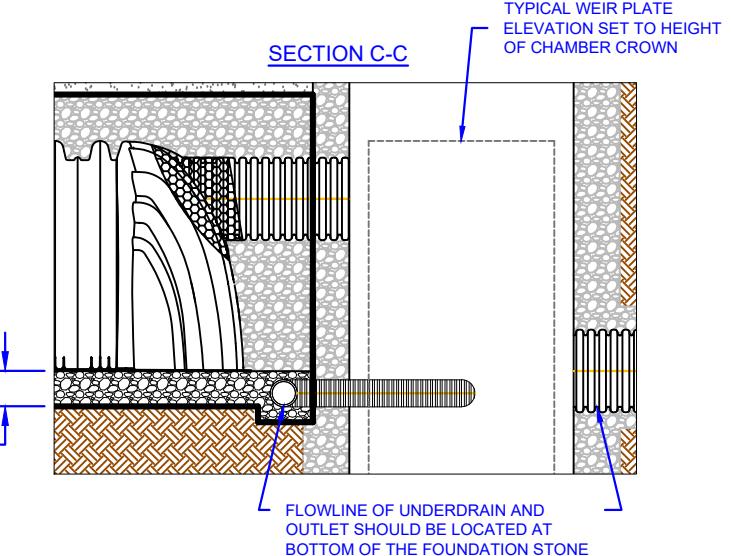
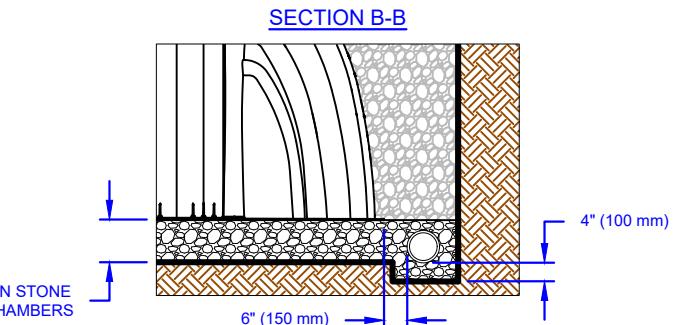
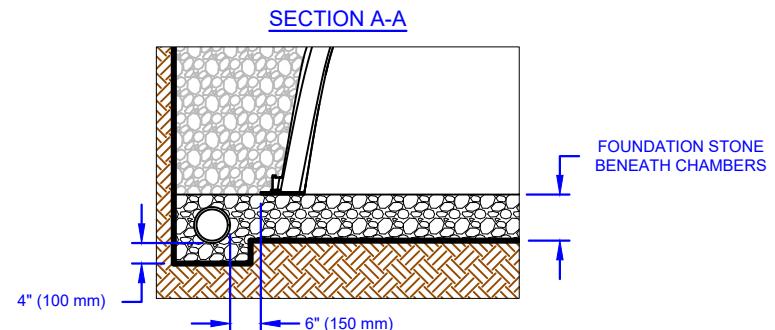
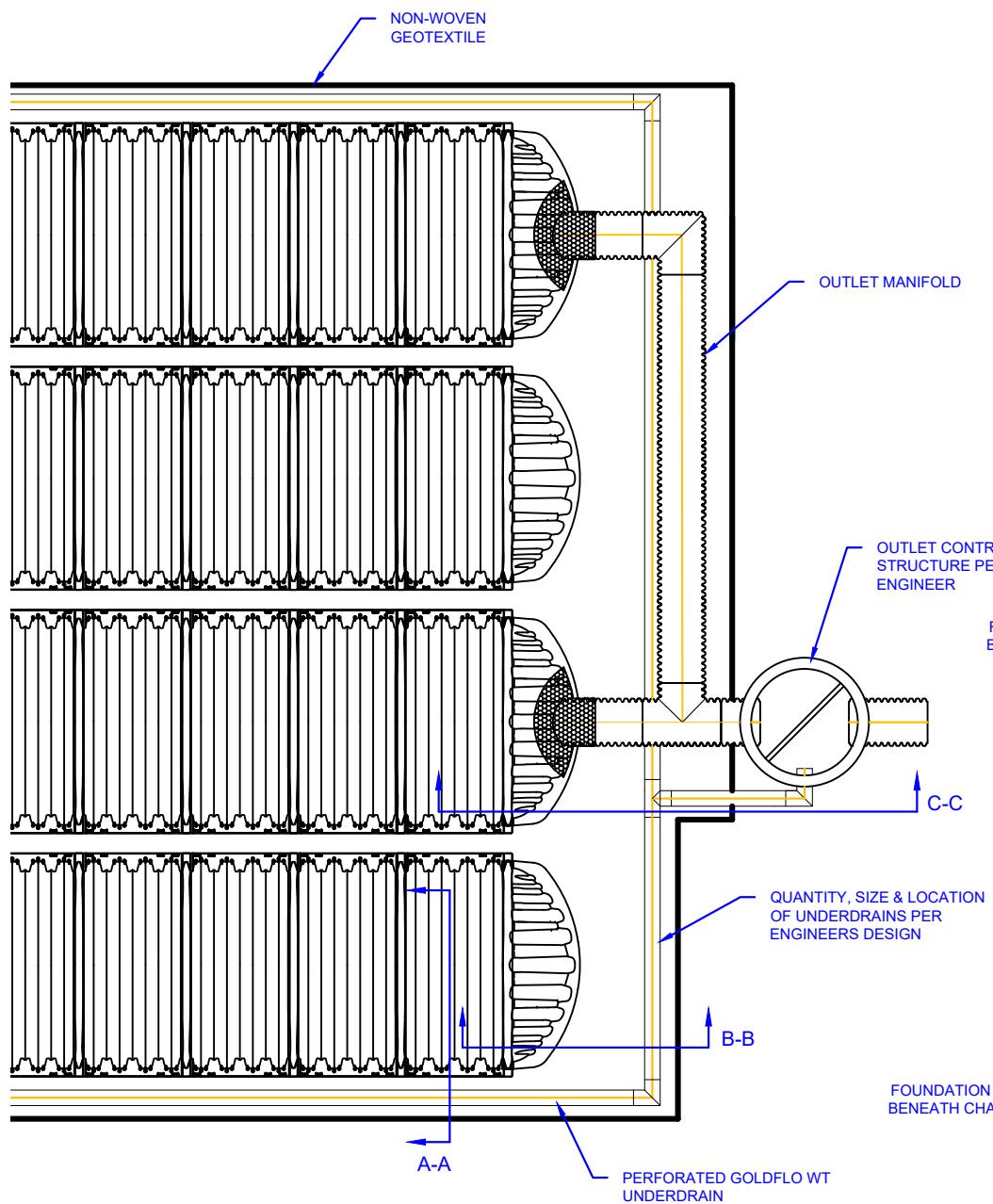


End Cap Specifications	
End Cap Size (L x W x H)	35.0" x 94.0" x 59.3" (889 x 2,388 x 1,506 mm)
Installed Length	32.4" (823 mm)
End Cap Storage	39.6 ft ³ (1.12 m ³)
Min. Installed Storage*	114.46 ft ³ (3.10 m ³)
Weight	79.9 lbs (36.24 kg)



*ASSUMES 12" (300 mm) STONE ABOVE CHAMBERS/END CAPS, 9" (230 mm) OF STONE FOR FOUNDATION STONE, 9" (230 mm) OF STONE BETWEEN CHAMBERS/END CAPS, 12" (150 mm) OF STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

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