

# The Capitol Subsurface Infiltration Gallery

SCVURPPP Green Stormwater Infrastructure Planning

November 29, 2018

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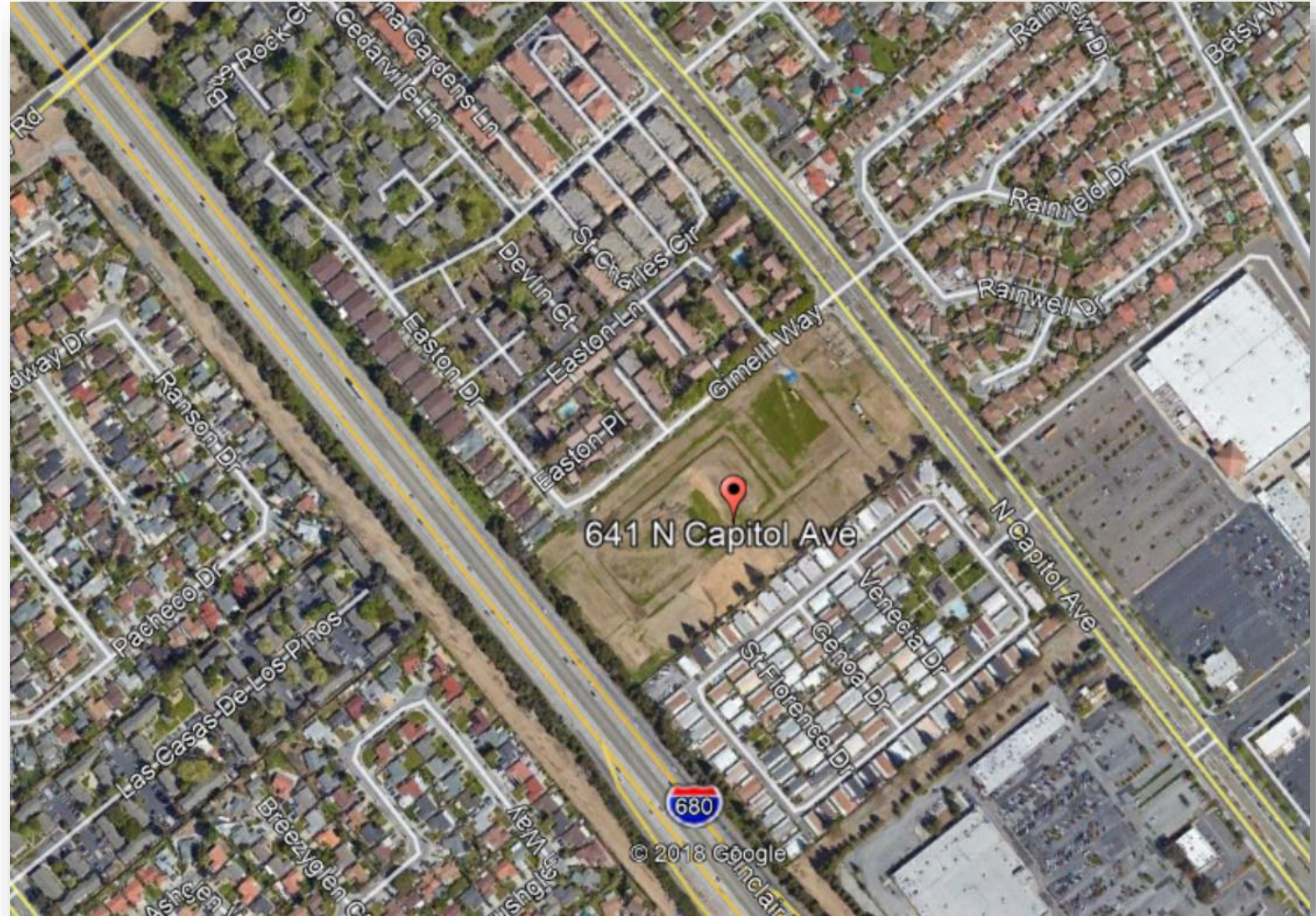
**Schaaf & Wheeler**  
CONSULTING CIVIL ENGINEERS

## Agenda:

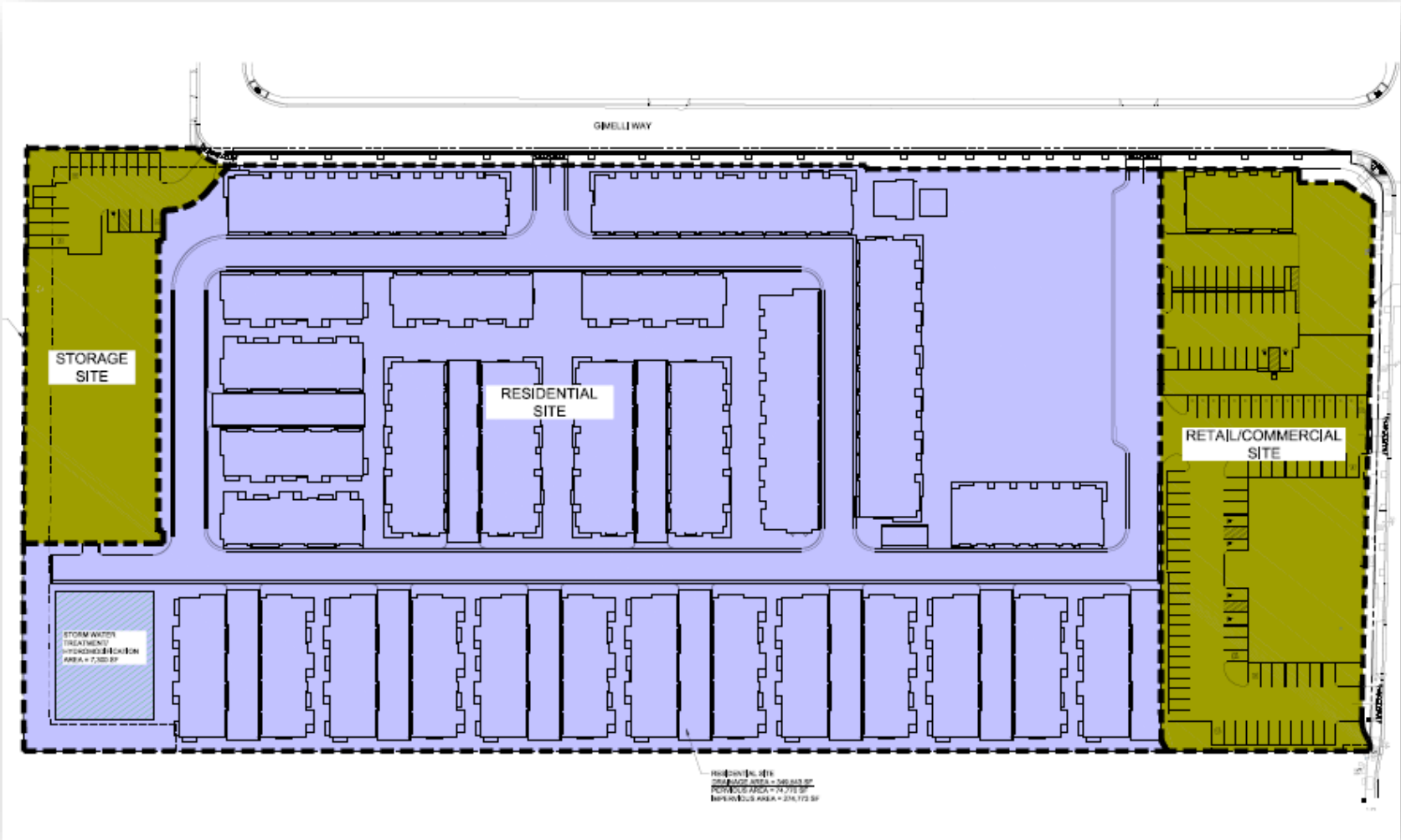
Project Overview  
Initial Pump Design  
Revised Design  
Lessons Learned  
Construction Pics  
Questions

## The Project:

10.32 acres  
Residential  
Retail/Commercial  
Storage



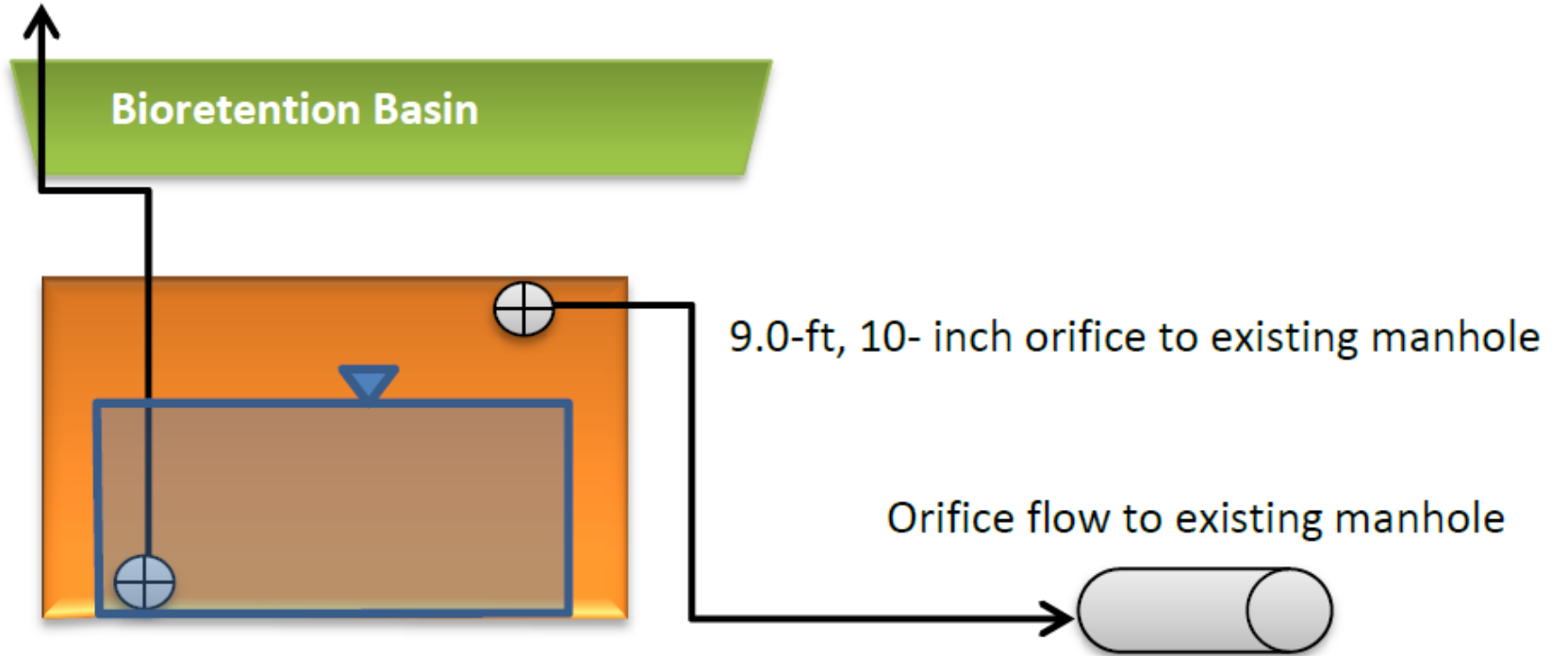
# Site Plan



## Initial Design:

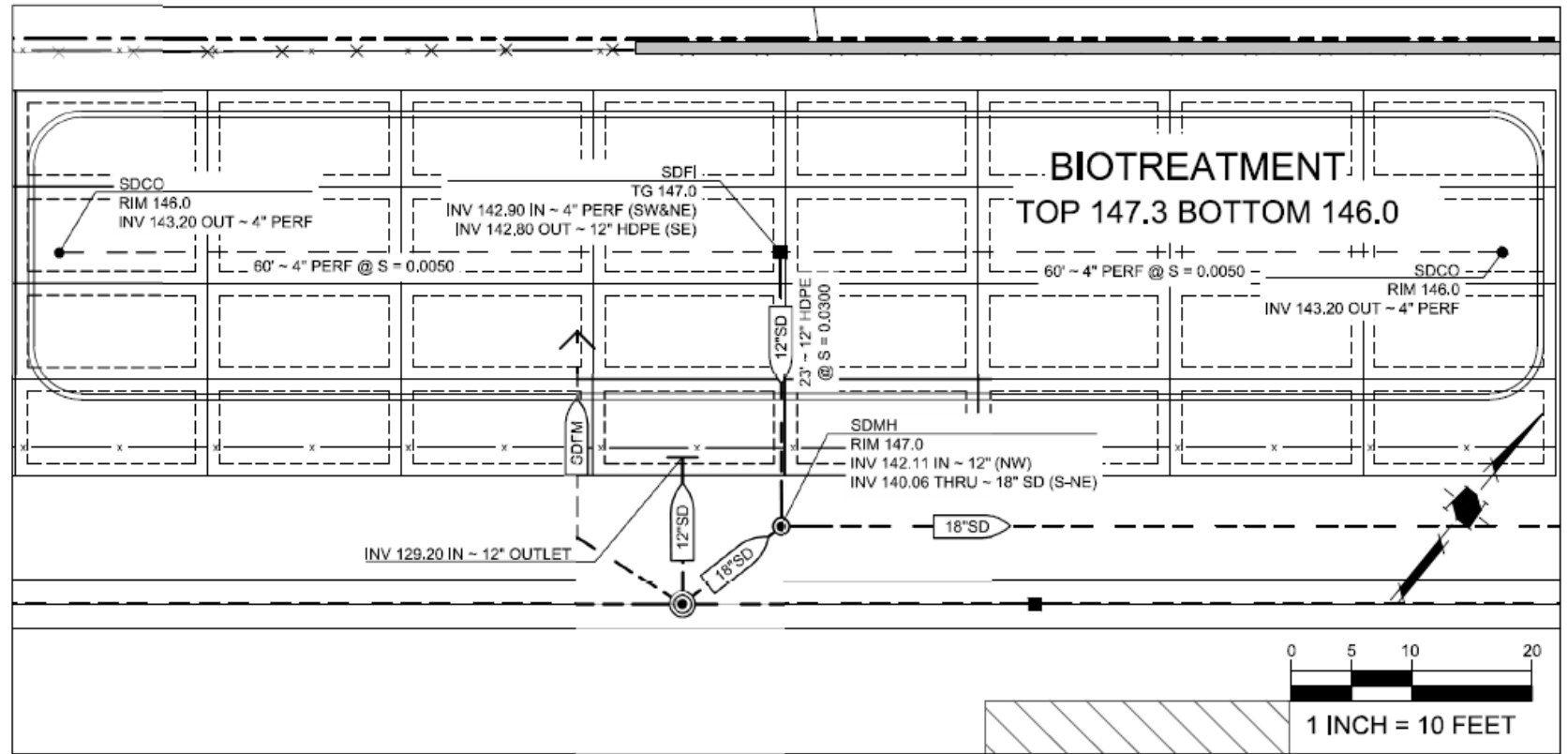
90'x 56' vault  
12' tall  
Pump to bioretention  
Bio sized on pump rate  
2,300 sf treatment

Pumped C3 treatment flow- 0.26 cfs

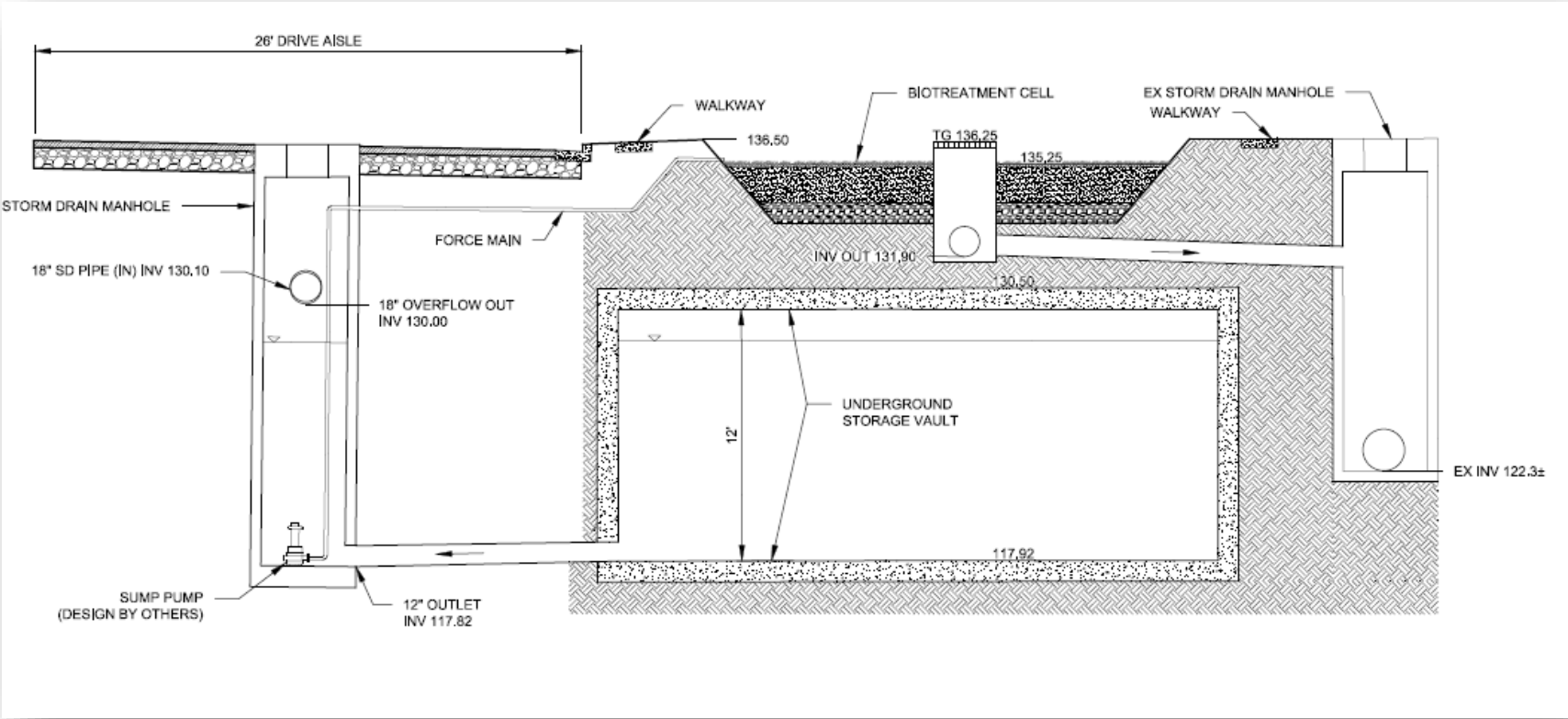


**Figure 1. HM Vault as Modeled in BAHM**

# Bird's Eye



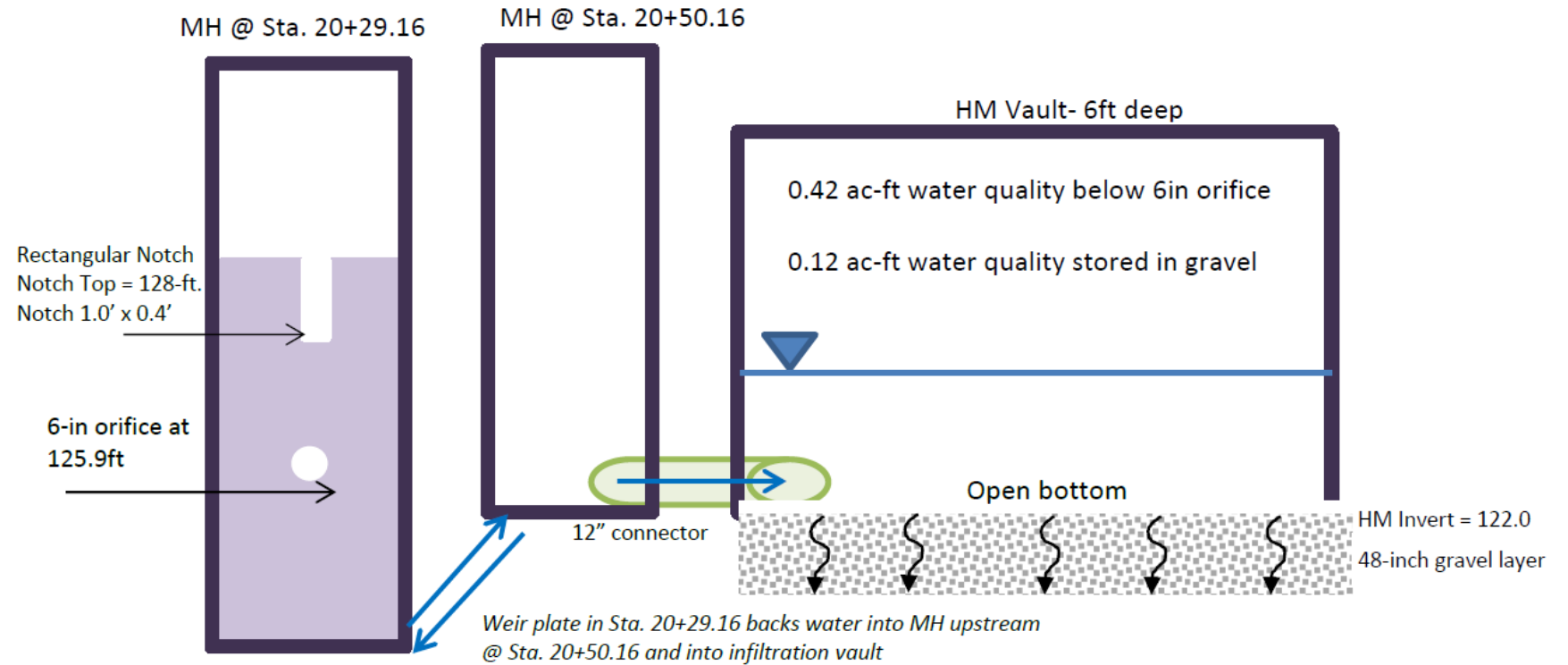
# Cross Section



## Revised Design:

Perc. Rate – 30in/hr  
10-ft below grade  
Open bottom vault  
C<sub>3</sub> = infiltration  
42' x 90'  
6' tall  
25% smaller footprint

# Park on top



Percolation Test # P-1 (NE corner)  
Percolation Test # P-2 (SW corner)

28 inches per hour  
32 inches per hour

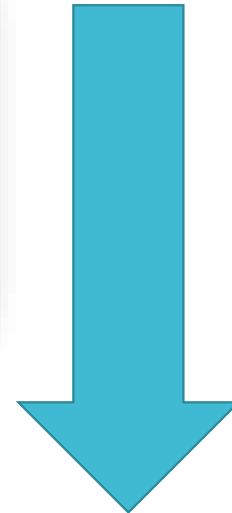
# Percolation does NOT equal Infiltration!

- Percolation Rate = 30 in/hr
- Infiltration rate = 9 in/hr
- Factor of Safety = 2.5

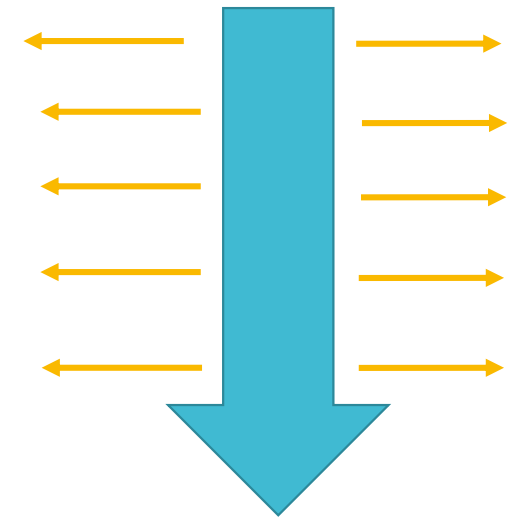
TABLE 1

Test Hole No.	Percolation Rate (in/hr)	Infiltration Rate (in/hr)
P-1	28	8.7
P-2	32	11.1
P-3	27	7.4

Infiltration



Percolation



# BAHM Reduction Factor

**SCENARIOS**

- Pre-Project
- Mitigated**

Run Scenario

**Basic Elements**

**Pro Elements**

**LID Toolbox**

**Sub Surface Infiltration System Mitigated**

**Facility Name**: Sub Surface Infiltration System

**Downstream Connection**

- Outlet 1: 0
- Outlet 2: 0
- Outlet 3: 0

Precipitation Applied to Facility

Evaporation Applied to Facility

**Facility Dimensions**

- Length (ft): 105
- Width (ft): 45
- Effective Depth (ft): 6

Fixed Width For Auto Vault

**Outlet Structure Data**

- Riser Height (ft): 6
- Riser Diameter (in): 15
- Riser Type: Notched
- Notch Type: Rectangular
- Notch Height (ft): 1
- Notch Width (ft): 0.4

**Infiltration**: Yes

Measured Infiltration Rate (in/hr): 9

**Reduction Factor (infiltr\*factor)**: 0.4

Use Wetted Surface Area (sidewalls): NO

Orifice Number	Diameter (in)	Height (ft)
1	0	0
2	6	3.9
3	0	0

Total Volume Infiltrated (ac-ft): 373.854

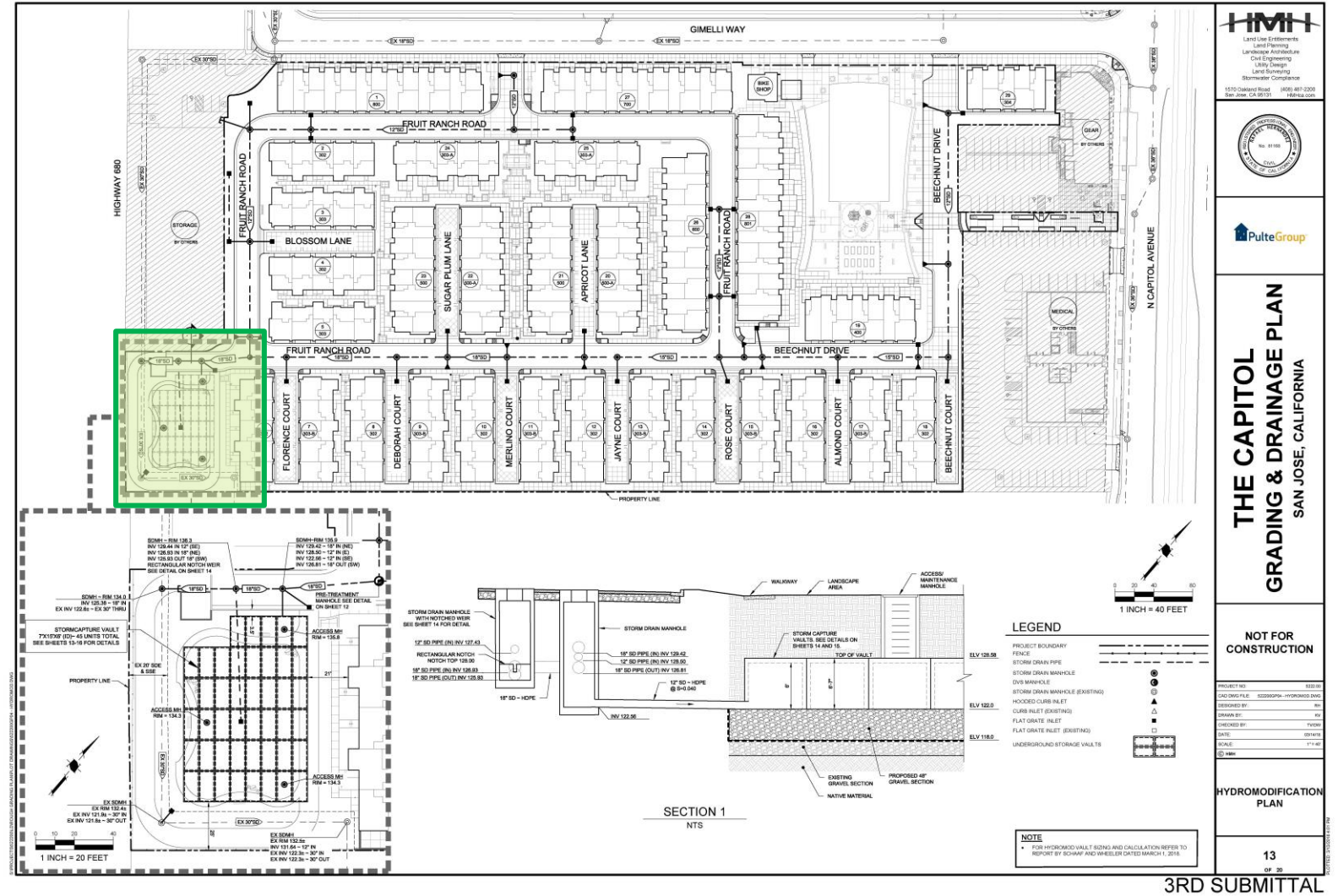
Total Volume Through Riser (ac-ft): 39.562

Total Volume Through Facility(ac-ft): 413.416

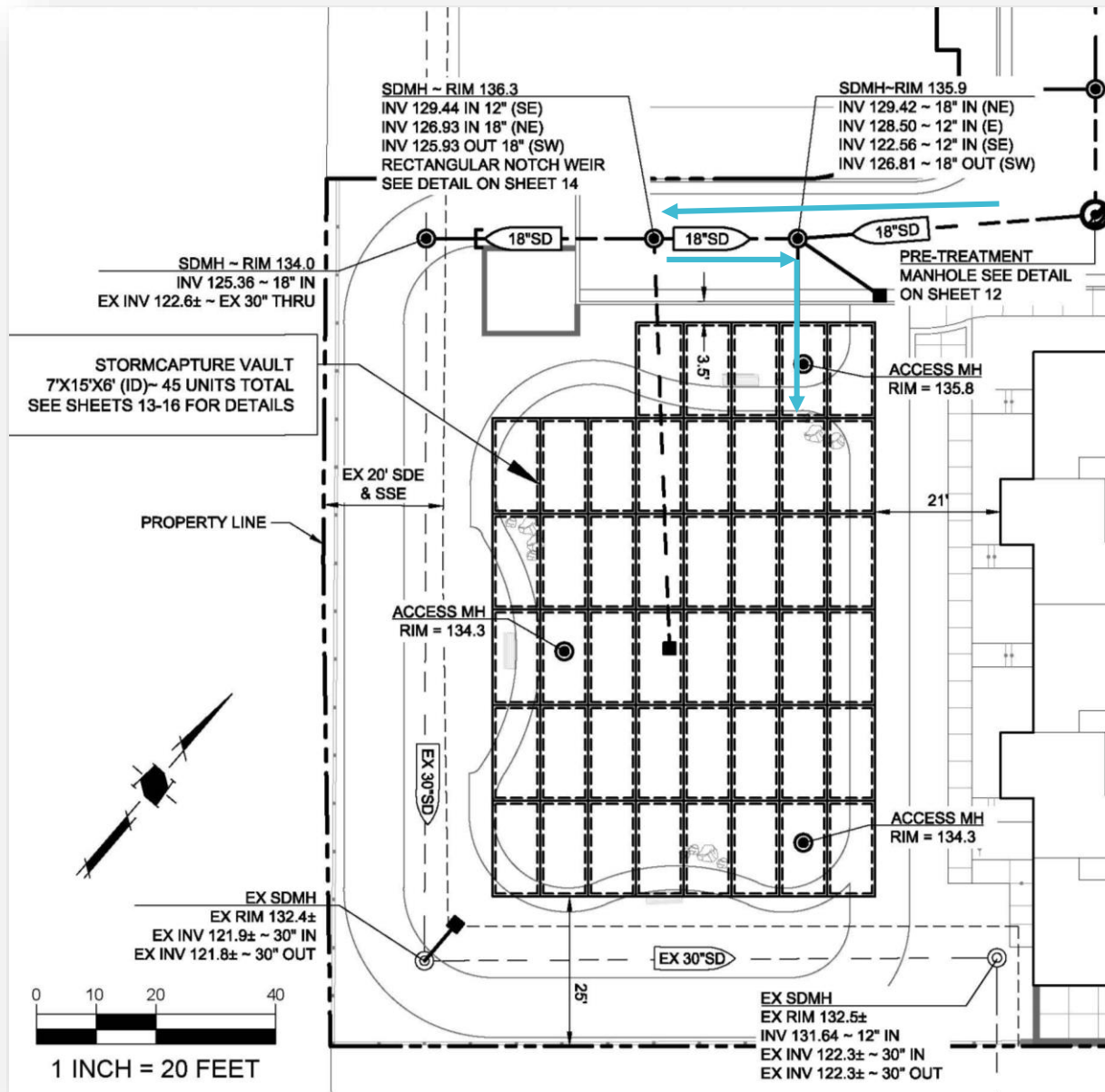
Percent Infiltrated: 90.43

Vault Volume at Riser Head (ac-ft): .644

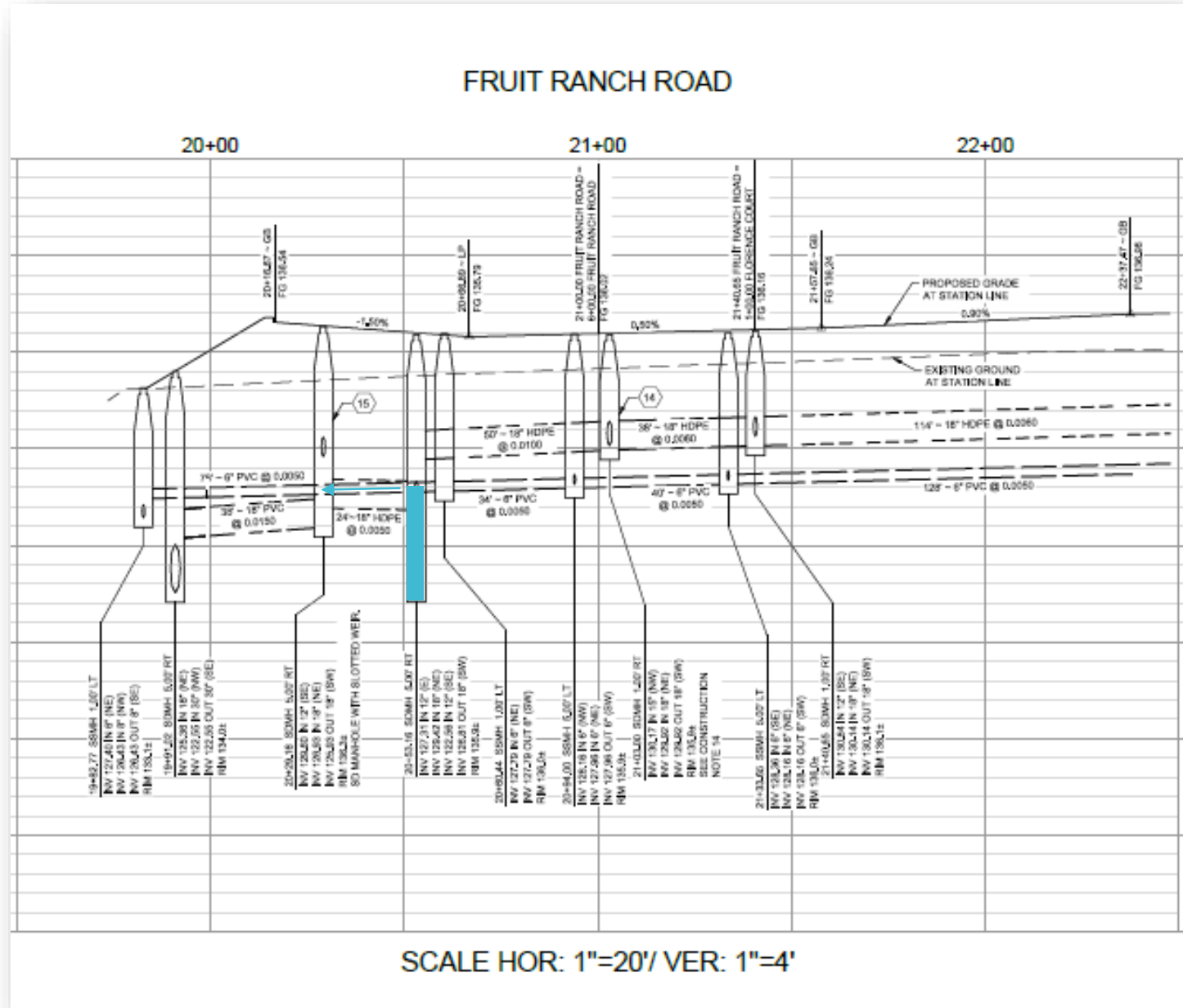
# Site Plan



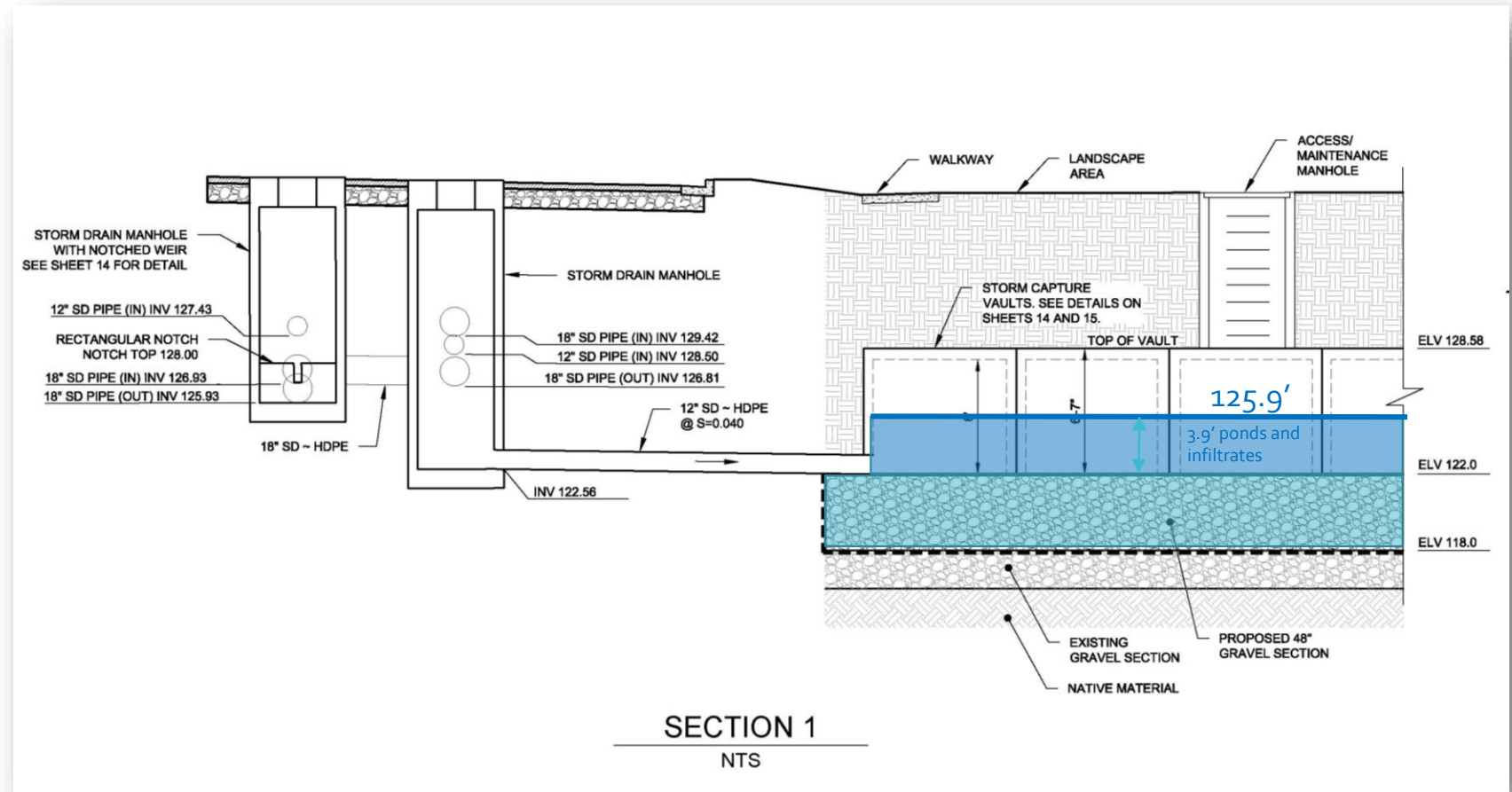
# Bird's Eye



# Profile



# Cross Section



Water Quality Volume  
0.45 ac-feet required

$$\text{Vault Storage} = \frac{3.9 \times 105 \times 45}{43560 \frac{\text{ft}}{\text{acre}}} = 0.42 \text{ acre feet}$$

$$\text{Gravel Storage} = \frac{(4 \times 105 \times 45) \times 0.35}{43560 \frac{\text{ft}}{\text{acre}}} = 0.15 \text{ acre feet}$$

0.57 ac-feet provided

# Vault System

**GENERAL NOTES:**

THE STORMCAPTURE SYSTEM BY OLDCASTLE STORMWATER SOLUTIONS IS PART OF THE STORMWATER MANAGEMENT SYSTEM FOR THE RESPECTIVE SITE, AS PREPARED BY THE PROJECT DESIGN ENGINEER. IT IS THE RESPONSIBILITY OF THE DESIGN ENGINEER TO DETERMINE DESIGN FLOW RATES, PRE-TREATMENT AND POST-TREATMENT REQUIREMENTS, STORAGE VOLUME, AND ENSURE THE FINAL DESIGN MEETS ALL CONVEYANCE AND STORAGE REQUIREMENTS, SYSTEM DESIGN AND TYPE, SOIL ANALYSIS, LOADING REQUIREMENTS, COVER HEIGHT AND MODULE SIZE DETERMINE THE FOUNDATION TYPE AND REQUIREMENTS AS STATED HEREIN. ANY VARIATIONS FOUND DURING CONSTRUCTION FROM THE SITE AND SYSTEM ANALYSIS MUST BE REPORTED TO THE PROJECT DESIGN ENGINEER. THE PROJECT DESIGN ENGINEER IS RESPONSIBLE FOR OBTAINING A GEOTECHNICAL ENGINEERING REPORT VERIFYING THE BEARING CAPACITY STATED IN DESIGN NOTES.

**DESIGN NOTES:**

- DESIGN LOADINGS:
  - AASHTO HS20-44 W/ IMPACT.
  - DEPTH OF COVER = 6" TO 5'-2"
  - ASSUMED WATER TABLE = BELOW BOTTOM.
  - EQUIVALENT FLUID PRESSURE = 45 PCF.
  - LATERAL LIVE LOAD SURCHARGE = 80 PSF.
  - NO LATERAL SURCHARGE FROM ADJACENT STRUCTURES.
- CONCRETE 28 DAY COMPRESSIVE STRENGTH SHALL BE 6,000 PSI.
- STEEL REINFORCEMENT: REBAR, ASTM A-615, GRADE 60.
- CEMENT: ASTM C-150 SPECIFICATION.
- STORMCAPTURE MODULE TYPE = DETENTION.
- REQUIRED BASE LAYER DEPTH = 2" SAND BEDDING LAYER.
- REQUIRED NATIVE ALLOWABLE SOIL BEARING PRESSURE = 2,500 PSF.
- REFERENCE STANDARDS:
  - ASTM C 890
  - ASTM C 891
  - ASTM C 913
- LESS THAN 6" OR GREATER THAN 5'-0" OF COVER REQUIRES CUSTOM STRUCTURAL DESIGN AND MAY REQUIRE THICKER SUBGRADE.

**INSTALLATION NOTES:**

STORMCAPTURE MODULES ARE TO BE INSTALLED IN ACCORDANCE WITH ASTM C891, INSTALLATION OF UNDERGROUND PRECAST UTILITY STRUCTURES. PROJECT PLAN AND SPECIFICATIONS MUST BE FOLLOWED ALONG WITH ANY APPLICABLE REGULATIONS.

- PLAN LINE, GRADE AND ELEVATIONS MUST BE FOLLOWED.
- WHERE SPECIFIED, AN 8 OZ. NON-WOVEN GEOTEXTILE FABRIC MUST BE USED AS A SEPARATION LAYER AROUND THE STORMCAPTURE SYSTEM.
- PENETRATIONS IN THE GEOTEXTILE MAY ONLY BE MADE WITH SMOOTH WALL PIPES. MAKE PENETRATIONS FOR ALL OUTLETS BEFORE MAKING PENETRATIONS FOR ANY INLETS.
- SUBGRADE MATERIALS, IF SPECIFIED, SHALL BE CLEAN, DURABLE CRUSHED AGGREGATE COMPACTED AS DIRECTED BY THE ENGINEER. OLDCASTLE RECOMMENDS SIZE 5, 56, OR 57 (PER ASTM C33).
- DESIGNATED EMBEDDED LIFTERS MUST BE USED. USE PROPER RIGGING TO ASSURE ALL LIFTERS ARE EQUALLY ENGAGED WITH A MINIMUM 60 DEGREE ANGLE ON SLINGS AS NOTED AND IN ACCORDANCE WITH OLDCASTLE LIFTING PROCEDURES.
- MODULES MUST BE PLACED AS CLOSE TOGETHER AS POSSIBLE, AND GAPS SHALL NOT BE GREATER THAN 3/4". ALL EXTERIOR SYSTEM JOINTS SHALL BE COVERED WITH A MIN. 8" JOINT WRAP ON SIDES AND TOP (CS-212 CONSEAL OR EQUIVALENT) IN A CLAM-SHELL DESIGN. INSTALL ONE ROW CS-102 CONSEAL (OR EQUIVALENT) BETWEEN PRECAST PIECES.
- AUTHORIZATION SHALL BE GIVEN BY THE PROJECT ENGINEER OR DESIGNATED PERSON PRIOR TO PLACEMENT ON BACKFILL FOR THE SYSTEM. CARE MUST BE TAKEN DURING PLACEMENT OF BACKFILL NOT TO DISPLACE MODULES OR JOINT WRAP. BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY OR AS SPECIFIED, AND SHALL NOT BE COMPACTED WITHIN 6" OF MODULE.
- CONSTRUCTION EQUIPMENT EXCEEDING DESIGN LOADING SHALL NOT BE ALLOWED ON STRUCTURE.
- TERMAJUDOTS TO BE KNOCKED OUT AT SPECIFIED LOCATIONS IN FIELD BY OTHERS. SEE SITE LAYOUT FOR LOCATIONS.

**INLETS AND RISERS:**

ALL PIPE INLETS SHALL EXTEND INSIDE MODULE A MINIMUM OF 4". PLACE A NON-SHRINK, NON-METALIC GROUT, MIN. 3,000 PSI IN ANNULAR SPACE TO ELIMINATE ALL VOIDS.

**REVISIONS**

REVISION	DATE	SHEETS	DESCRIPTION OF REVISION

**TYPICAL ISO VIEW**  
N.T.S.

**STORMCAPTURE**

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MODULE & GENERAL ISO	1
TYPICAL ELEVATION	2
EXTERIOR DETAILS	3
INTERIOR DETAILS	4

NOTE: THIS VIEW IS FOR ILLUSTRATION PURPOSES ONLY TO SHOW FEATURES OF THE SYSTEM. ACTUAL LAYOUT VARIES BY PROJECT. SEE SITE PLAN LAYOUT. ALL PROJECTIONS WILL BE COILED.

\*THIS MUST BE FILLED OUT BEFORE MANUFACTURING BEGINS\*

APPROVED W/ NO EXCEPTIONS TAKEN:

APPROVED AS NOTED:

REVISE AND RESUBMIT:

**- PRELIMINARY -**

**NOT FOR CONSTRUCTION**

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

**Oldcastle**  
Stormwater Solutions

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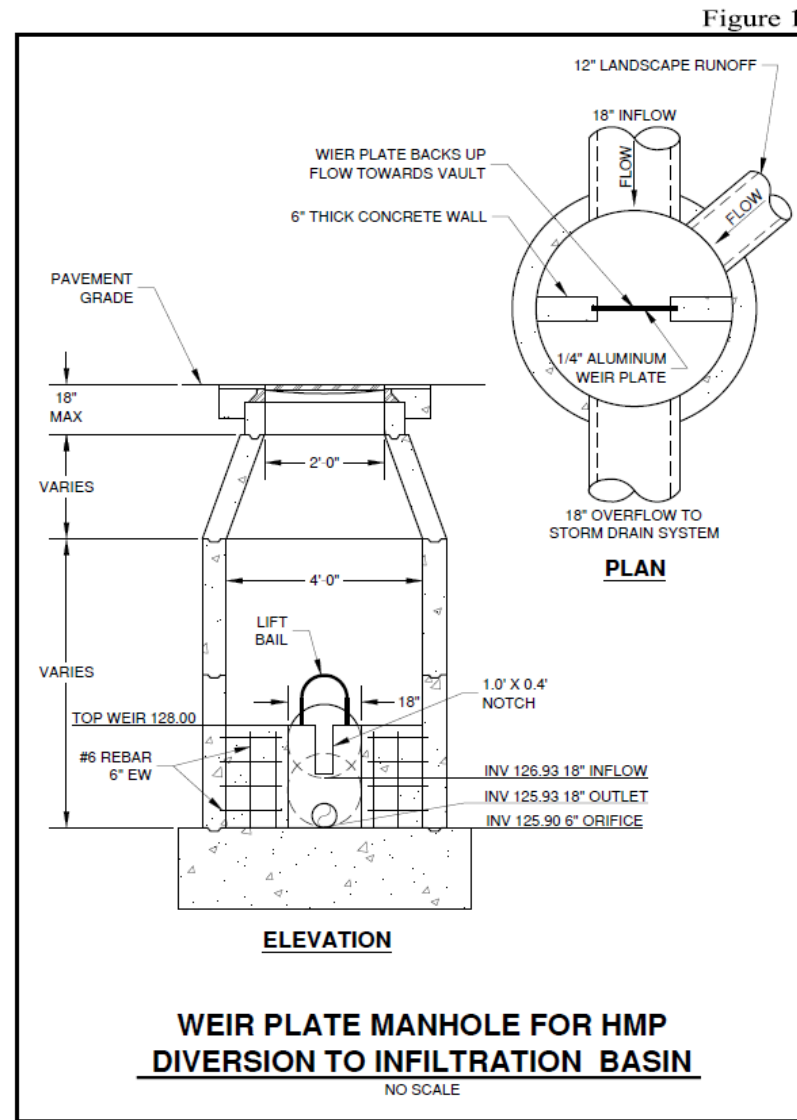
**STORMCAPTURE**  
GENERAL ISO

DATE: \_\_\_\_\_ SCALE: \_\_\_\_\_ SHEETS: \_\_\_\_\_ OF \_\_\_\_\_

REVISED: \_\_\_\_\_

S22 - 418.dwg 1 OF 4

# Weir Plate Design



# Excavation



# Light Compaction



# Gravel Layer & Vaults



# Questions



# Project Partners

