



# MILWAUKEE COUNTY SPORTS COMPLEX PERVIOUS PAVEMENT

By: Sean Hayes, P.E.

# Milwaukee County Sports Complex

## Pervious Pavement

Project Overview

Site

Planning

Design

Construction

Maintenance

Evaluation

Lessons Learned



# Project Overview

- Milwaukee County Sports Complex
  - ▣ Multi-use facility
    - Roller derby to dog shows.
    - Lot is often full (Maximize Parking)
  - ▣ 5 acre, 600 stall, parking lot.
    - 1 acre asphalt, 4 acres gravel
    - Had agreement with City of Franklin to eventually pave entire lot.
    - Departments worked together co-funding the project
    - Our first pervious pavement parking lot project
      - Project had to demonstrate effectiveness

# Site





# Site





# Site





# Site



# Site



# Planning

- Tour of Similar Sites
- Research
  - ▣ Milwaukee County Parking Lot Stormwater Guide
- Met With Manufacturers

MILWAUKEE COUNTY  
PARKING LOT STORMWATER  
MANAGEMENT DESIGN GUIDELINES





# Planning - Tour





# Planning - Tour



# Planning - Tour





# Planning - Tour



# Planning - Tour





# Planning - Tour



# Planning - Tour





# Planning - Tour



# Planning - Tour





# Planning - Tour



# Design



- Geotechnical engineer for soil borings.
- Collaboration between Site Civil, Stormwater Engineer, Landscape Architect.
- Small consulting contract to review conceptual design.

# Design

- Geotechnical engineer for soil borings.
  - ▣ Soil strength
  - ▣ Infiltration rates
  - ▣ Depth to ground water
  - ▣ Frost susceptibility
  - ▣ Made recommendations on base layers required for pervious pavement

# Design



- Consultant Review Contract
  - ▣ Small contract
  - ▣ Review and comment on concept plans
  - ▣ Provided and extra level of comfort



# Design

- Milwaukee County Parking Lot Stormwater Guide.
- DNR TECH STD
  - STD 1002 (Site Evaluation for Stormwater Infiltration)
- Permeable Interlocking Concrete Pavements, 3<sup>rd</sup> Ed.
  - Interlocking Concrete Pavement Institute
- Other
  - EPA – Permeable Interlocking Concrete Pavement
  - New Jersey Stormwater Manual



# Design

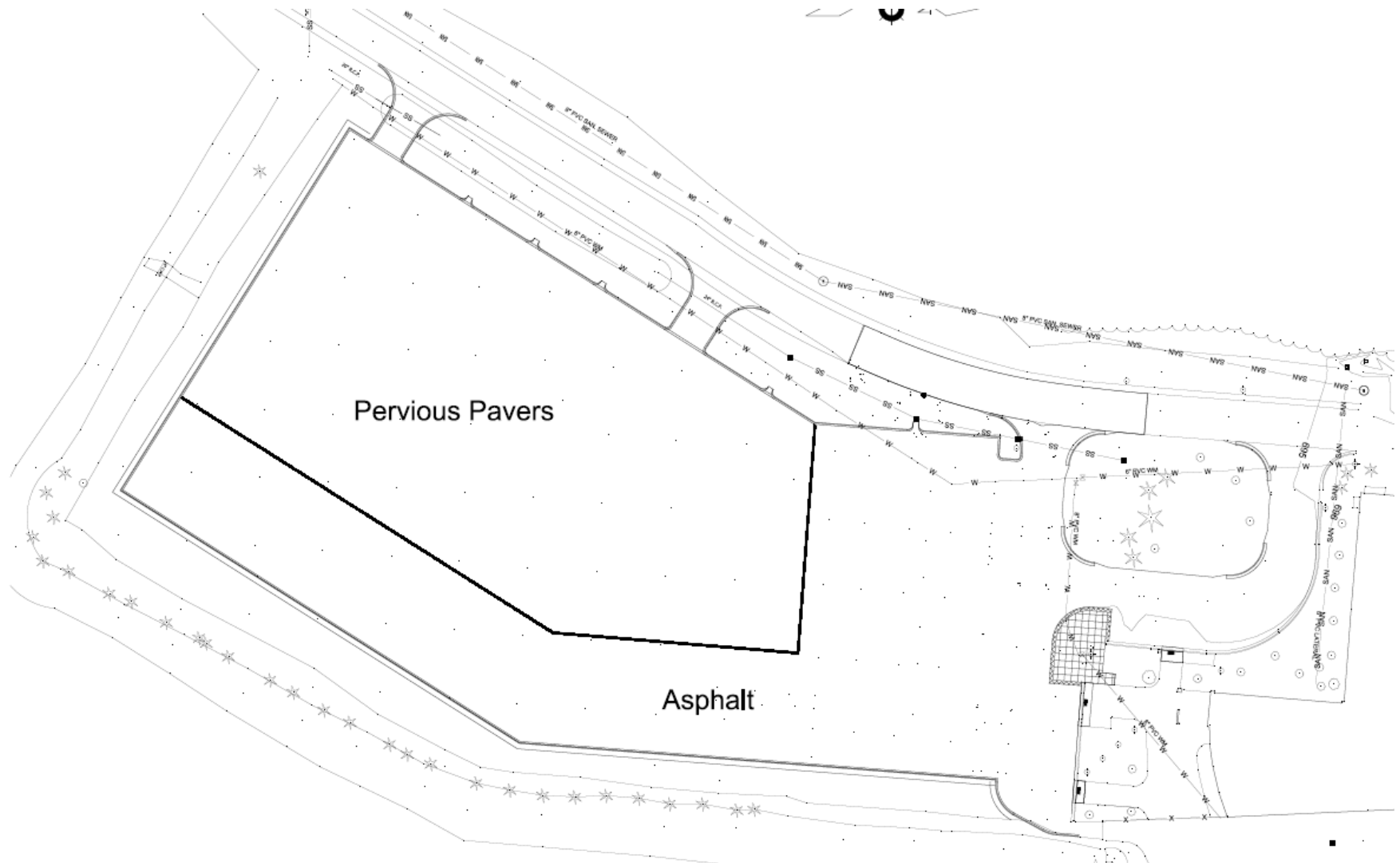
- Considered
  - ▣ Parking capacity
    - Maximize
  - ▣ Maintenance capacity
    - Winter plowing
    - Adjustability
  - ▣ Treatment capacity
    - TSS
    - Peak flow reduction
  - ▣ More subsurface storage
  - ▣ Pavers only in parking stalls
  - ▣ Less total pavers
  - ▣ Future bike path expansion

# Design

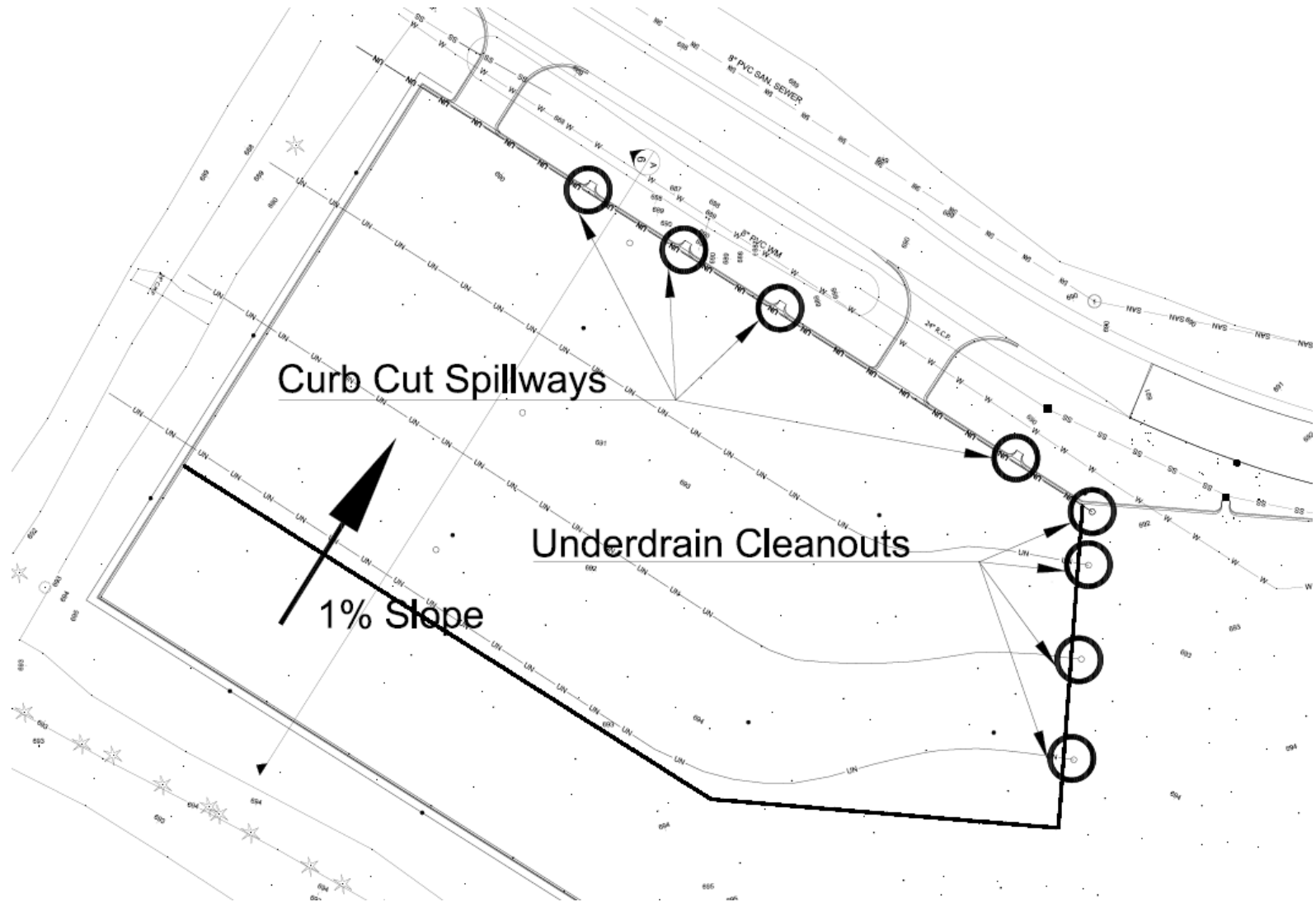
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- Fail Safe Aspects
  - ▣ Underdrains
  - ▣ Underdrain clean outs
  - ▣ 1% surface slope
  - ▣ Curb cut drains

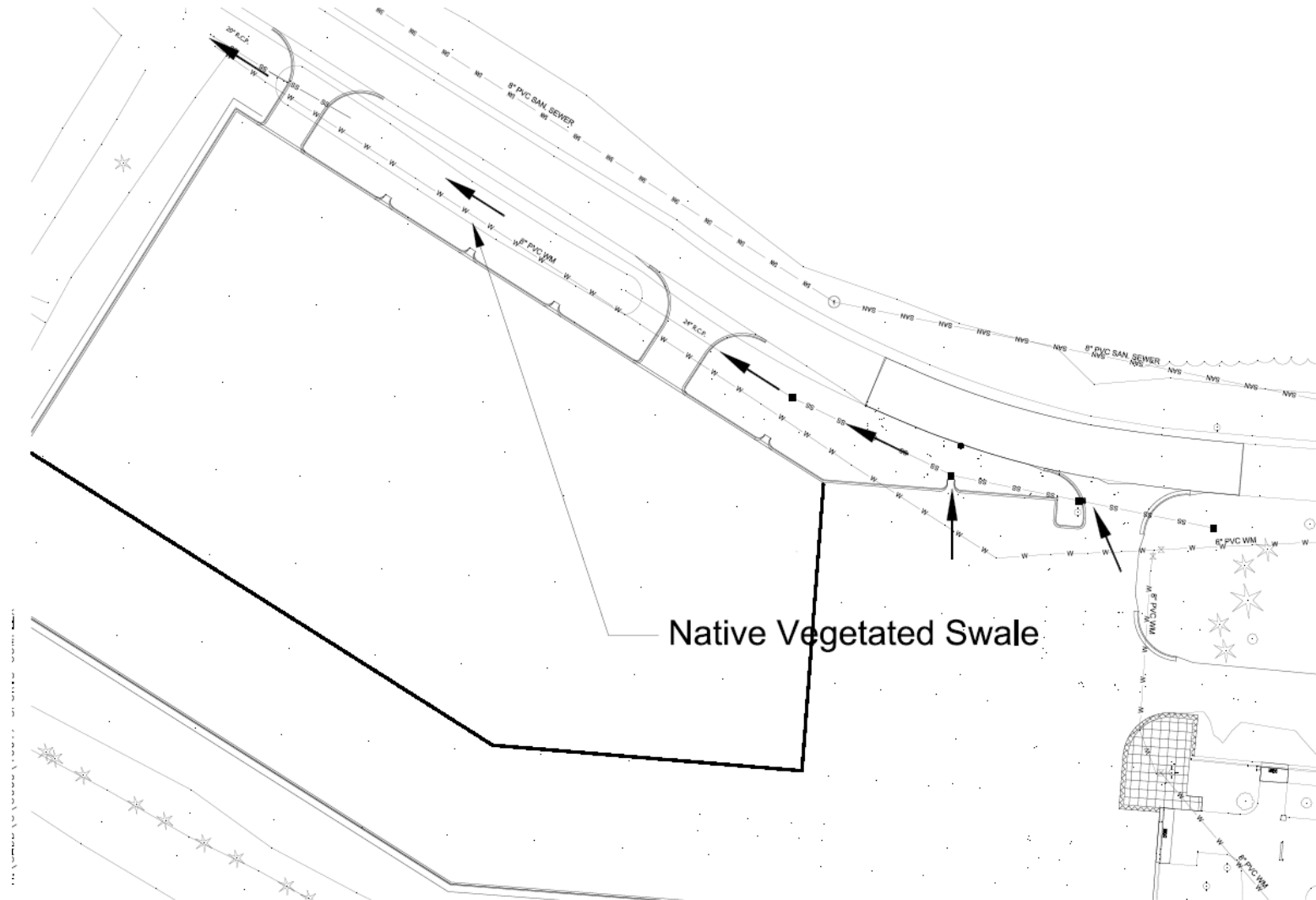
# Design



# Design

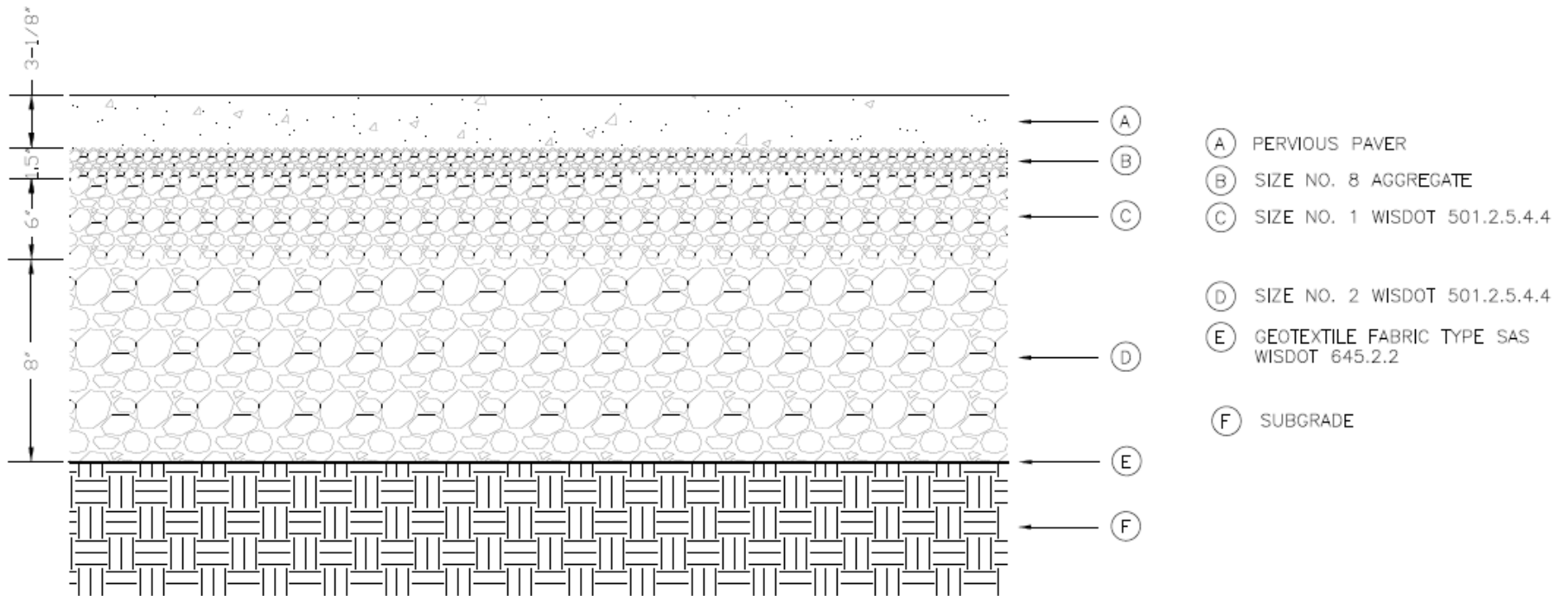


# Design



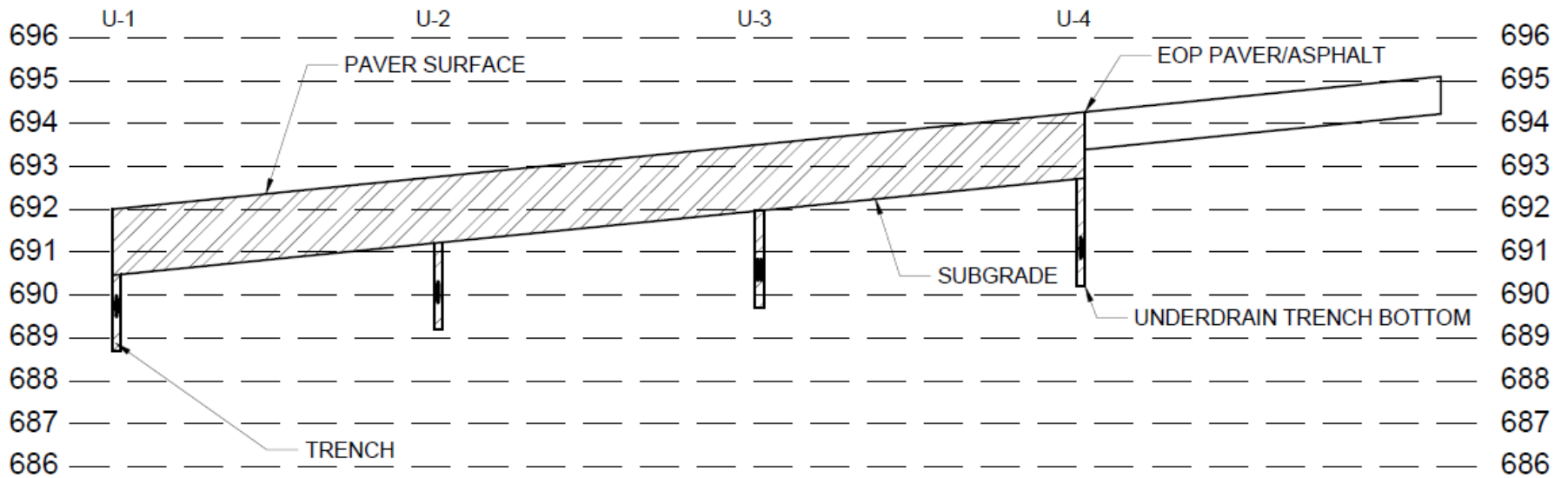


# Design



**POROUS PAVEMENT SECTION**

# Design

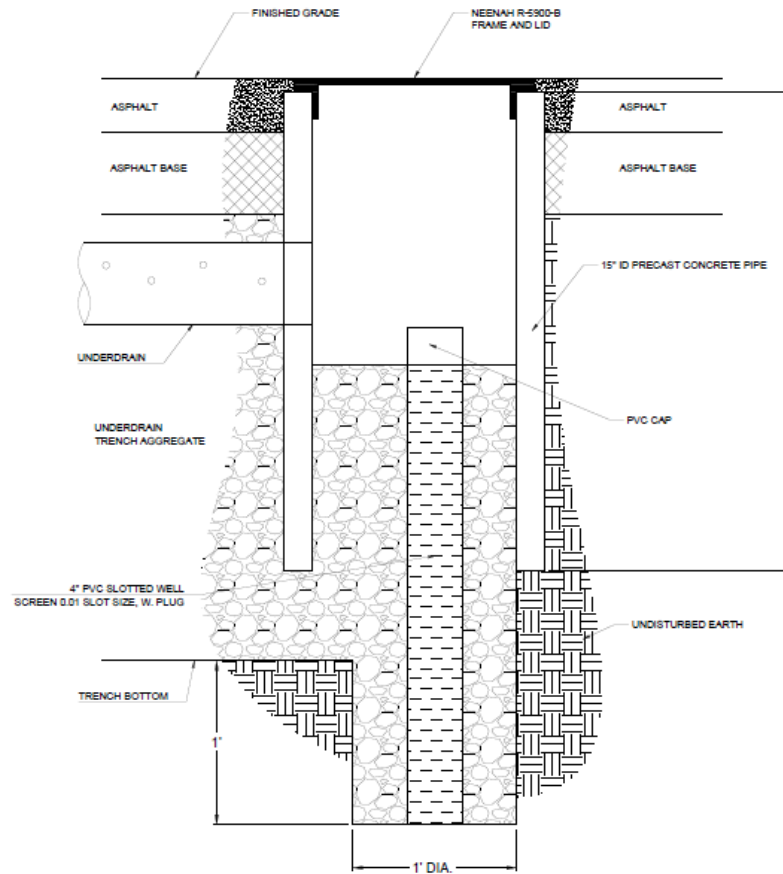


UNDERDRAIN SECTION A

SCALE: H1"=30' V1"=3'



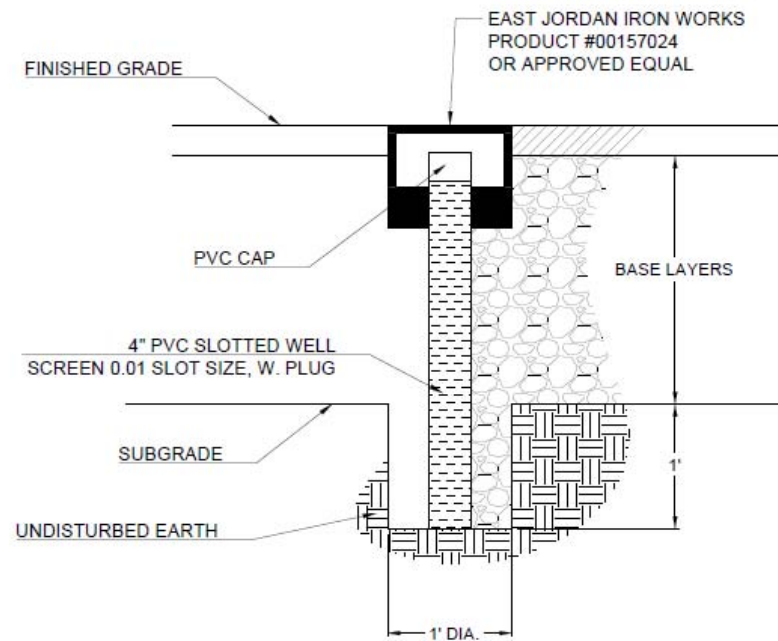
# Design



UNDERDRAIN CLEAN OUT DETAIL

SCALE: NTS

# Design



NOTE: WELL COVER SHALL BE SECURED IN CONCRETE SURROUND (1'-6" TOTAL DIA.).

OBSERVATION WELL

SCALE: NTS





# Construction





# Construction



# Construction





# Construction



# Construction





# Construction





# Construction



# Construction



# Maintenance

- UNILOCK – Pervious Paver Maintenance Guide
  - ▣ Refill joint material
    - ~6 months after installation
    - Every 5-10 years there after
  - ▣ Winter plowing
    - Plow as you would concrete.
    - Can use nylon edge blade for cosmetic reasons
      - (Johnson Controls uses. Costs ~\$200/snow in new blades)
  - ▣ Avoid stockpiling snow / topsoil / mulch / etc.



# Maintenance

## **1. After the snow melt – March 1 through April 15**

- Broom, blow, rotary brush or sweep entire surface.
- Clean debris from paver surface in location of snow stockpile area.
- Replenish joint aggregate material after cleaning.
- Every fifth year, vacuum or power wash problem areas and refill joint material.

## **2. Late Spring – April 1 through May 15**

- Broom, blow, rotary brush or sweep flowers from trees and shrubs.
- Collect any additional debris from areas mulched or planted with annual flowers.
- Replenish joint aggregate material as necessary.

## **3. Late Summer – July 15 through August 30**

- Broom, blow, rotary brush or sweep lawn and shrub clippings or tree fruits.
- Collect any additional debris from summer activities such as charcoal coals inadvertently dumped on the permeable surface, beach sand, etc.
- Replenish joint aggregate material as necessary.

## **4. Late Fall – October 15 through November 30**

- Broom, blow, rotary brush or sweep plant leaves.
- Replenish joint aggregate material as necessary.

# Evaluation

- Compare effluent from underdrains and effluent from paved surfaces.
  - ▣ TSS
  - ▣ Oils and greases
  - ▣ Conductivity
- Monitor observation wells over time
  - ▣ Record depths over time
- Visual observations over winter
  - ▣ Cracked bricks
  - ▣ Frost heave

# Next Time...

- Add more control
  - ▣ Manhole / elevation control structures
- Push for more green space
  - ▣ Islands etc.
- Evaluate using less pervious surface area
  - ▣ Maybe 1/3 total paved area
- Specify brick pattern layout





# Thanks!

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