



Grit Traps Reduce Maintenance on Inverted Siphons

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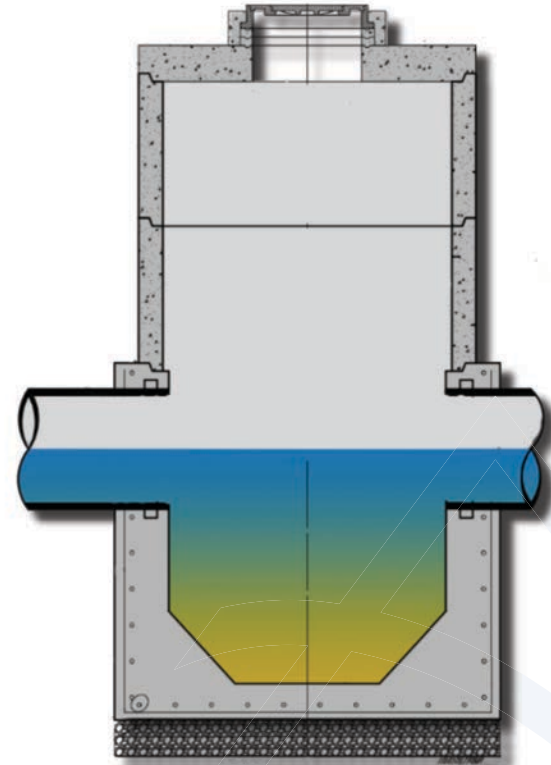
Agenda

- What is a Grit / Gravel Trap?
- Cleaning Operations & Maintenance
- Case Studies
- Lessons Learned
- Q&A



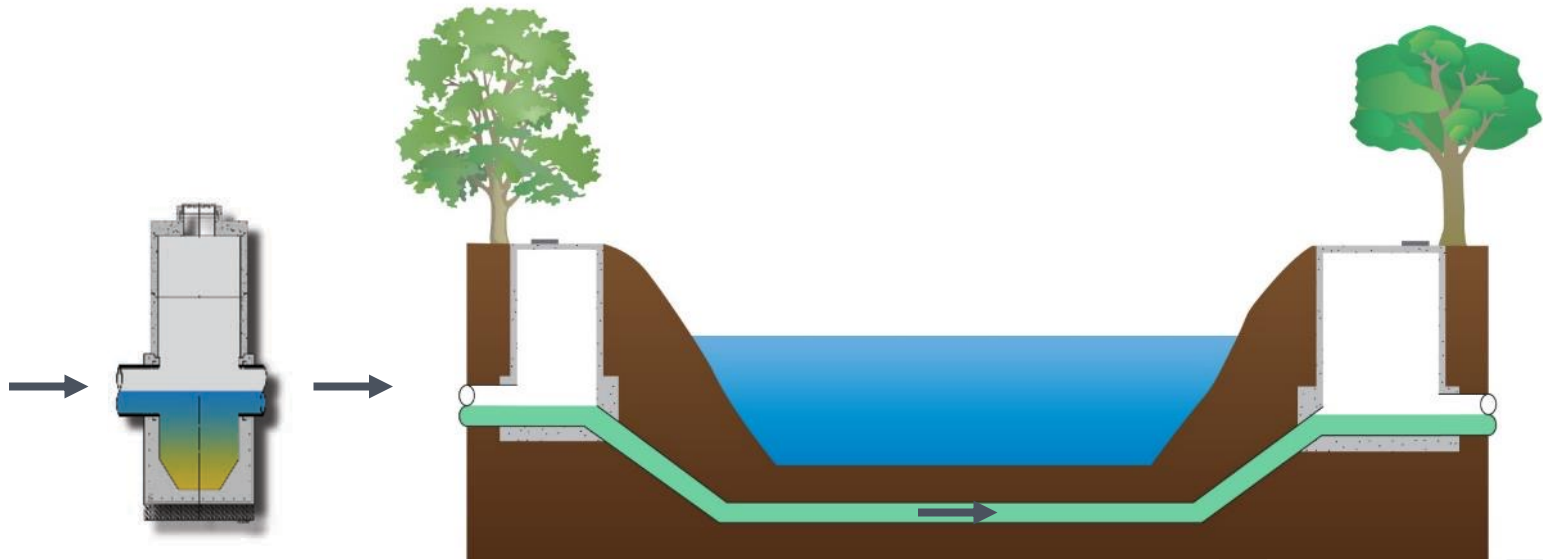
Gravel Trap (also known as a Grit Trap)

- ▶ Simple, yet innovative structure; essentially an oversized manhole with the bottom dropped that captures grit and gravel upstream of an inverted siphon.
- ▶ Larger Sewers
 - **8 feet diameter (typical)**
 - **5 feet deep**
- ▶ Adjust size based on flow



Inverted Siphons

- ▶ Typical use for grit traps – Inverted Siphons



Cleaning Grit Traps

- ▶ Step 1: Take off Manhole Lid
- ▶ Step 2: Visual Inspection
 - Approx. every six months will fill with Grit
- ▶ Step 3: Utilize a Long Rod to start breaking up Grit and other organic materials, so it is easier to vacuum out
- ▶ Step 4: Assemble Nozzle, and adjustable suction relief, allows air to be sucked into vacuum tube, works best in the 25% open position,
- ▶ Step 5: Water/grit gets pulled into cleaning unit

Recommendations for New Siphons & Grit Traps

- ❑ Maintenance early on is Key
- ❑ Frequency of inspections from the beginning = less issues in the future
- ❑ Start off with inspecting quarterly or every 6 months, then annually or as-needed, to ensure everything is operating properly



Cleaning Grit Traps: Adjustable Suction Relief



Cleaning Grit Traps:



Cleaning Grit Traps: Video 1

- ▶ Initially cleaner water/air.
- ▶ Inspection tube turns dark with grit & debris



Cleaning Grit Traps: Video 2



Cleaning Grit Traps: Cleanings



Case Studies

Town of Easton, Massachusetts

Oro Loma Sanitary District, California

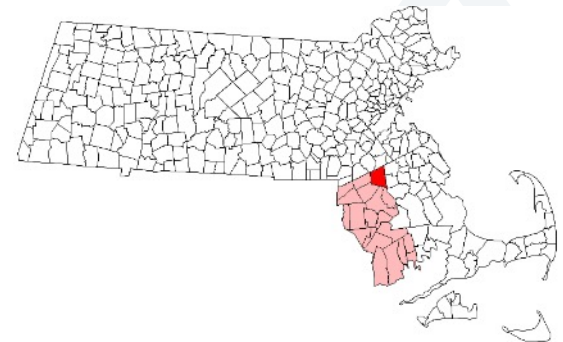
City of Santa Clara, California (2)

City of Morgan Hill, California

City of Irvine, California

Town of Easton, Massachusetts

- ▶ Inverted siphon to prevent a deep sewer cut on the highly traveled, narrow Foundry Street
- ▶ Downstream of housing development pump station capable of flushing siphon
- ▶ Added grit trap for belt and suspenders maintenance approach
- ▶ Located off-road to facilitate maintenance
- ▶ Constructed during COVID pandemic



Town of Easton, Massachusetts

- Installed August 2020
- 8-inch gravity sewer
- 200-300 gpm
- Grit Trap –
 - 5' Diameter
 - 4' Deep
 - ~\$10k



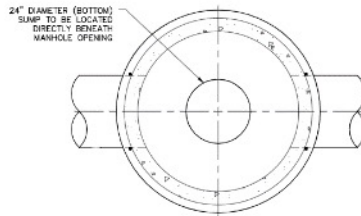
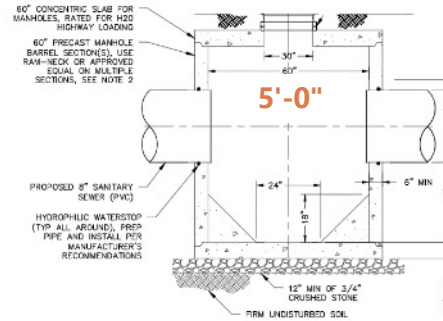
Town of Easton, Massachusetts: Construction



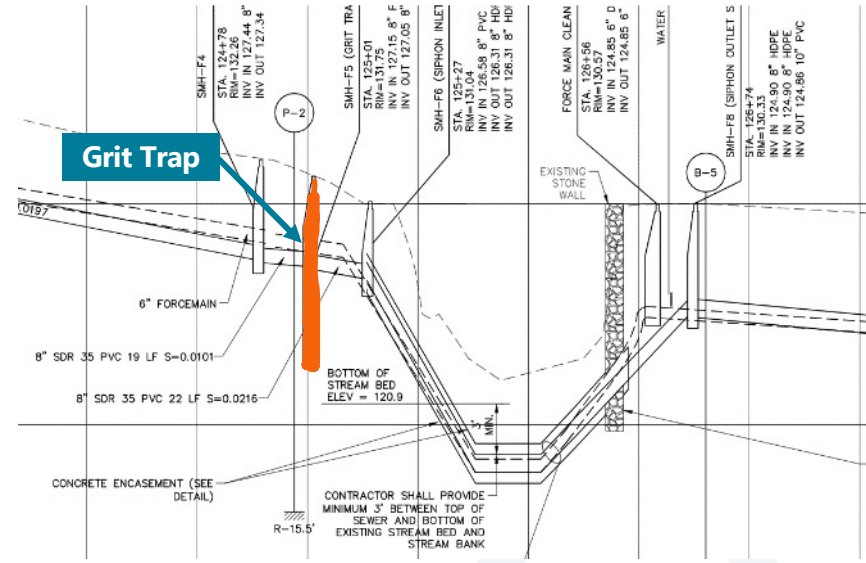
Stream Crossing/Siphon



Siphon Construction



Grit Trap



8" HDPE Siphon

Town of Easton, Massachusetts: Siphon Cleaning

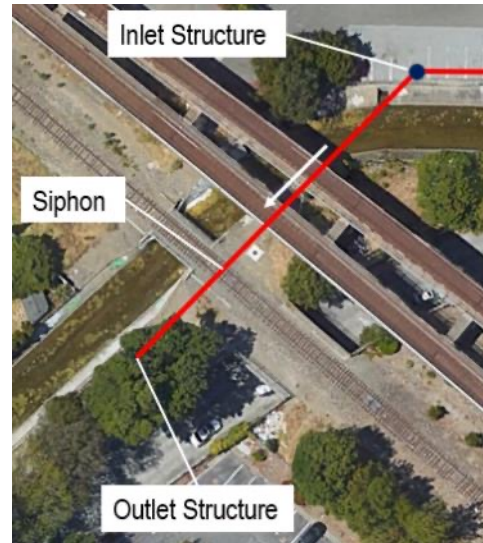
- ▶ Cleaned 2x – limited to no grit/sediment buildup.
 - March 2021 – 6 months
 - Dec. 2021 – 16 months
- ▶ Minimal grit loadings – monitoring as more users are connected
- ▶ No odors



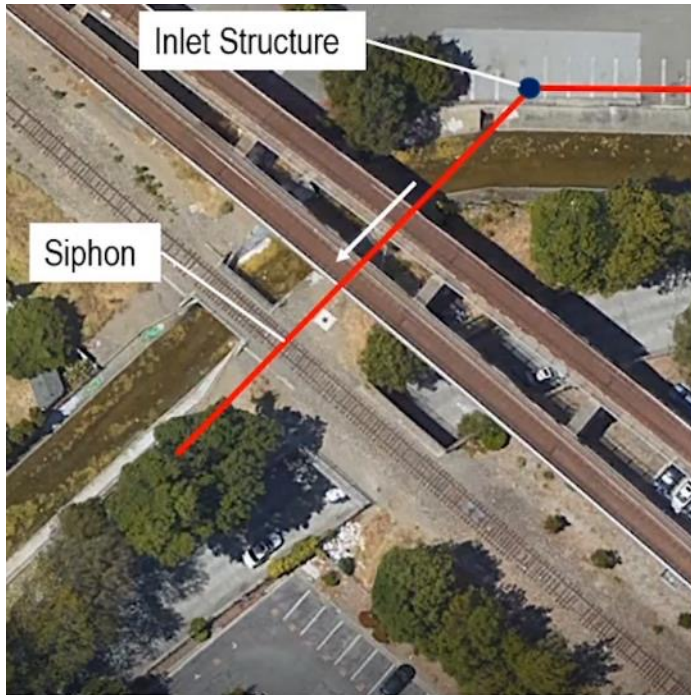
Oro Loma Sanitary District

► Bayfair Siphon

- Single Barrel Siphon
- 36-inch Diameter Sewer
- Difficult to Access
- Difficult to Clean

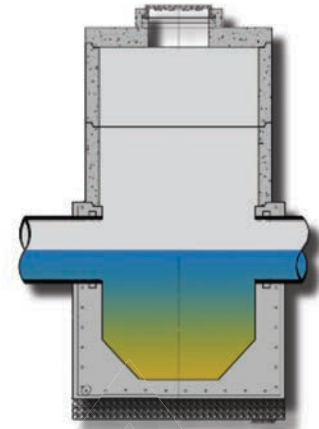
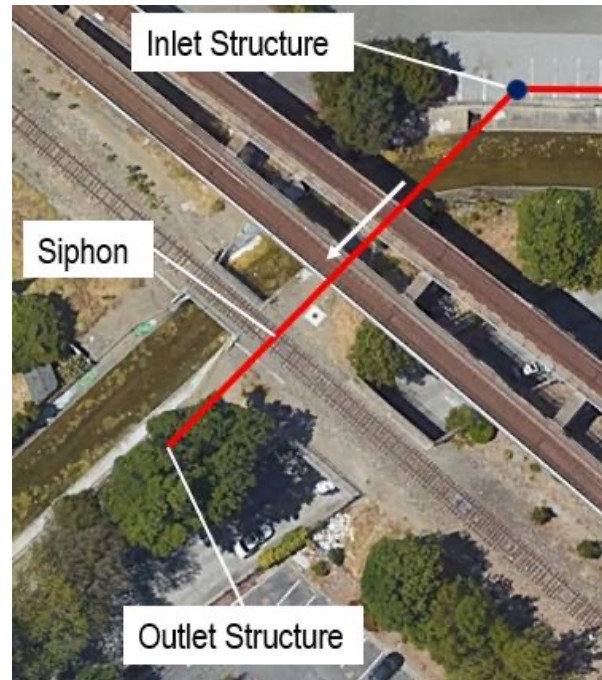


Inlet Structure located in Parking Lot



Solution = Grit Trap

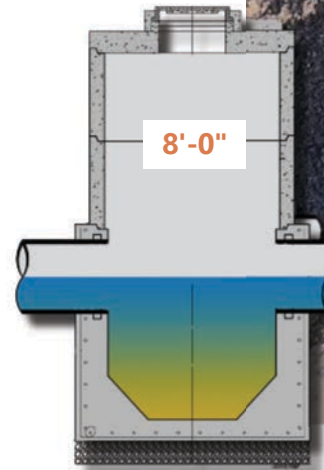
- ▶ Grit Trap was constructed
- ▶ Located upstream of siphon so they could capture the grit and gravel before it gets to the inverted siphon



City of Santa Clara, California

► Walsh Ave (new siphon)

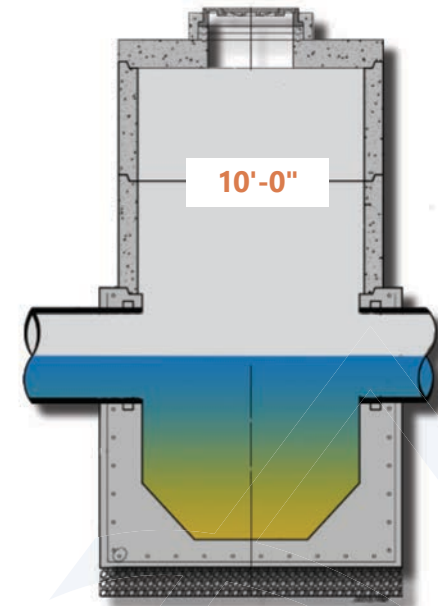
- Installed in 2011
- 27-inch diameter sewer
- 9.5 feet to invert of sewer
- Trap is 5 feet deep, 8 feet in diameter
- 4 to 4.5 yards cleaned per cycle
- Inspected every 6 months
- Emptied yearly



City of Santa Clara, California: Construction

► Trimble Road Trunk Sewer Improvements

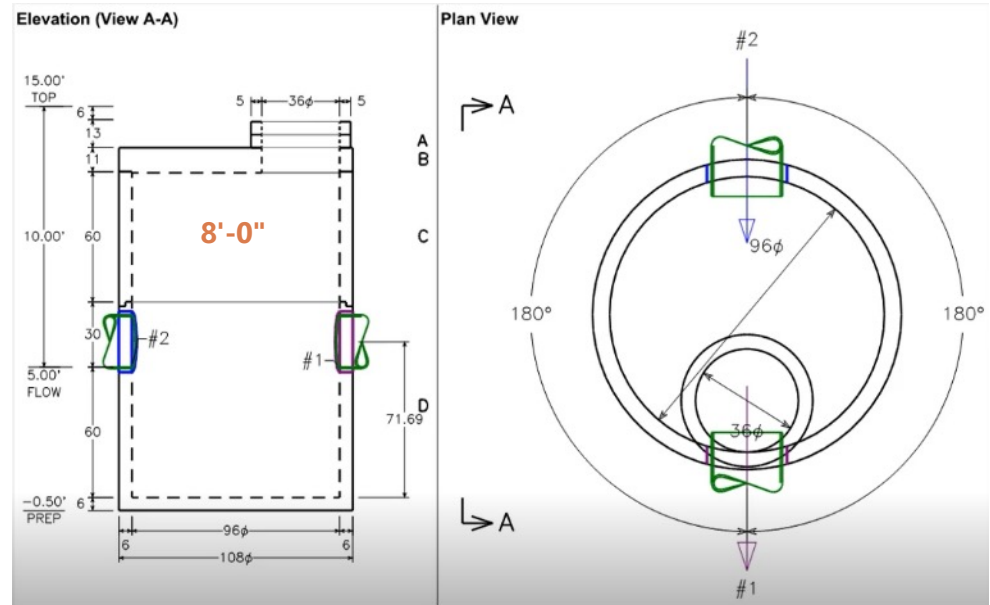
- Existing inverted siphon
- Diameter of Sewer: 48-inch (1200 mm)
- Depth to Invert of Sewer: 8-feet (2.4 meter)
- Diameter of Grit Trap: 120-inch (3000 mm)
- Depth to Bottom of Grit Trap from Ground Surface: 13-feet (4 meters)
- Three bidders:
 - \$85,000 (low bidder)
 - \$40,000
 - \$85,000
- Date of Bid Opening: February 2015



City of Morgan Hill, California

► Grit Trap Installed in Morgan Hill, California

- Used Polymer Concrete instead of Cast in place Concrete
- Installed July 2020
- Will not corrode, came in pre-cast units
- Not constructed in an existing sewer, but rather a new parallel sewer, as the acting sewer was being removed



Irvine, California

► Grit Trap Installed in Irvine, California

- Grit trap installed
- Installed September 2020
- Constructed around reinforced concrete, active 42-inch sewer



Lessons Learned

- ▶ No Reported Odors
- ▶ Grit trap captures smaller particles than expected
- ▶ Cleaning a grit trap is easier than cleaning a big siphon
- ▶ Relatively inexpensive on new system
- ▶ Installing a grit trap upstream of existing siphons should be strongly considered if the inverted siphon is difficult to clean.

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Thank You

Questions/Discussion

Inverted Siphons & Grit Traps in Easton Massachusetts

Polling Questions:

1. Do you have a Grit/Gravel Trap in a collection system?
 - A. Yes
 - B. No

2. Have you had difficulties cleaning a siphon?
 - A. Yes
 - B. No

