Self Leveling Manhole Technology

Protecting the Integrity of Your Roadways and Minimizing Maintenance Costs

Agenda

- Self Leveling Manhole Technology
  - Overview
  - Installation Procedures
- Materials & Performance Standards
  - Materials
  - ASTM, AASHTO (Proof Load Testing)
  - NYSDOT Proof Load Test Procedure
- Progress with NYSDOT (EJ Submission – SELF-LEVEL®)
  - Installation Cases/where used
  - Results/feedback
  - Why they keep coming back

Self Leveling Manhole Assembly

Self Leveling Manhole Assembly

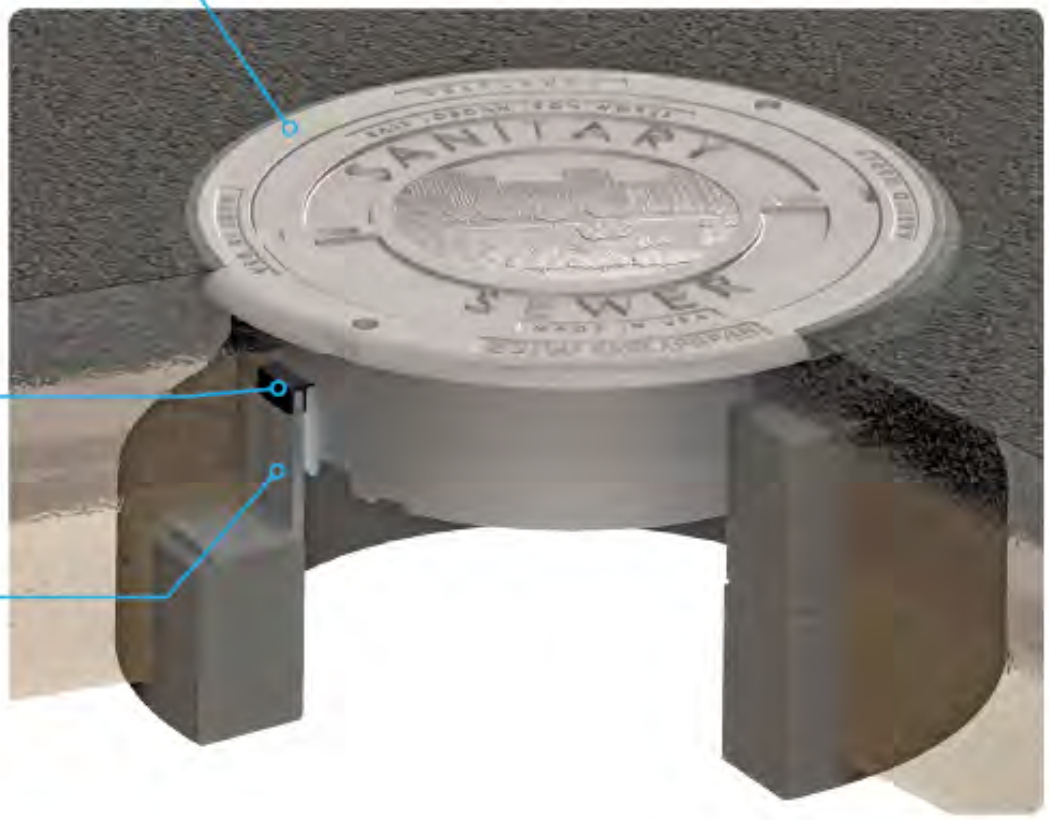
- Designed to allow upper frame to move with the road surface (frost heave/settling)
  - During installation and beyond
- Can be installed to match the road with up to 5º slope
- Easy installation

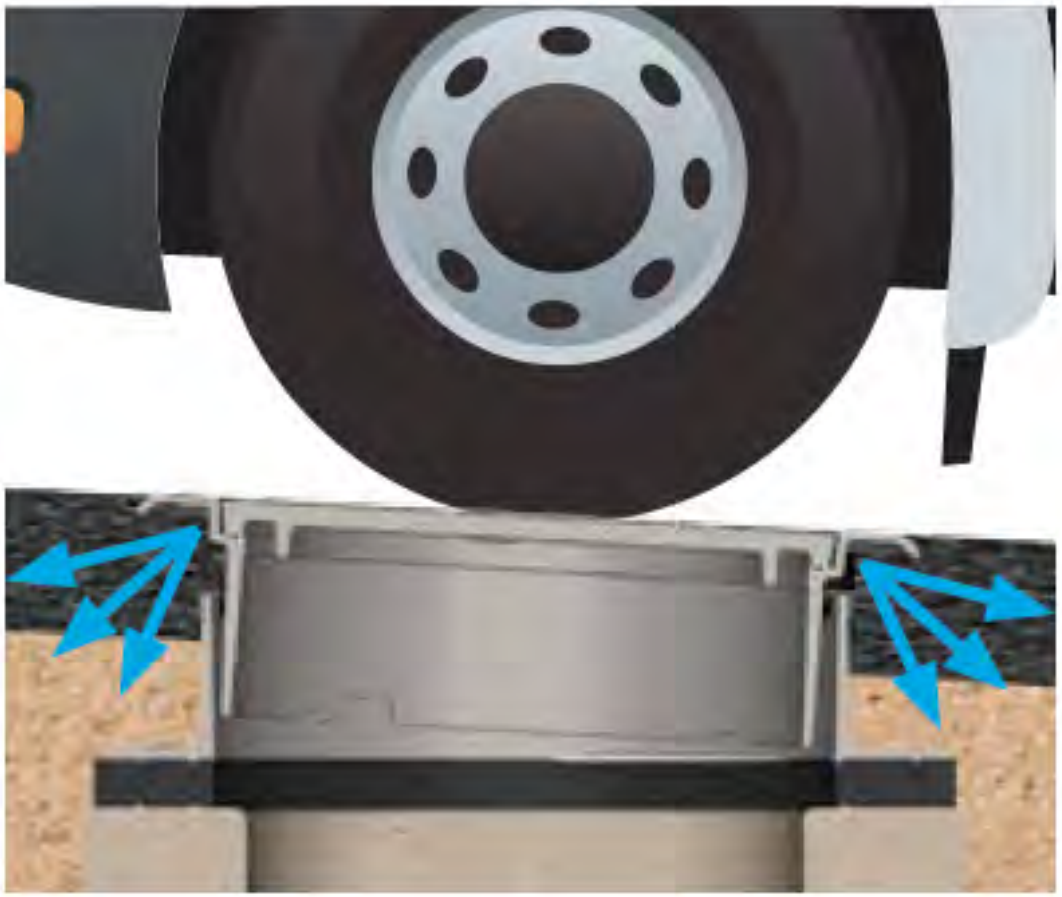
Components

Upper Frame
The upper frame of the SELFLEVEL assembly is supported by and moves with the surrounding road surface. This allows it to remain level with the road surface. This "floating" affect helps prevent road damage and protects the infrastructure underground by dispersing traffic vibrations and shock throughout the road surface, rather than into the structure below.

Multi-functional Seal
The multi-functional seal helps keep the upper frame centered within the guide frame, which prevents the two pieces from touching.

Guide Frame
This frame facilitates self-centering. The guide frame comes with a multi-functional seal. It reduces water infiltration and protects against excess debris and material from entering the manhole.





Impact stress transferred to road surface
instead of the hammering effect on the manhole

What Does It Accomplish/Solve?

- Flush Installation with graded road surface
- Protects below grade manhole structure
- Moves with the asphalt road surface during frost heave/settling
- Significant reduction in maintenance cost for unnecessary road repairs

What Does It Accomplish/Solve?

Progress With NYSDOT

- 11/14/14: Submitted SL Assembly with approved DOT cover.

- 11/24/14: Response from NYSDOT, requesting a successful trial installation prior to granting approval.
  - "…the concept of a manhole that stays flush with the roadway surface regardless of the season has merit."

NEW YORK STATE OF OPPORTUNITY. Department of Transportation	ENGINEERING INSTRUCTION	EI 17-007

Title: SPECIAL SPECIFICATION FOR ASPHALT PAVEMENT SUPPORTED MANHOLE FRAME AND APPROVED COVER

Approved:

/s/ Richard D. Wilder — 8/3/17
Richard D. Wilder, P.E. — Date
Deputy Chief Engineer, Design

ADMINISTRATIVE INFORMATION:

- **Effective Date:** This Engineering Instruction (EI) is effective beginning with projects submitted for the lettings on or after January 1, 2018.
- **Superseded Issuances:** This EI does not supersede any other issuances.

PURPOSE: The purpose of this EI is to issue a Main Office special specification for an Asphalt Pavement Supported Manhole Frame and Approved Cover.

TECHNICAL INFORMATION:

- This EI establishes a new product with enhanced capabilities of flush fittings to pavement surfaces before and after installation.
- All the provisions of section 655 – Frames, Grates, and Covers shall apply.
- Currently the specification is proprietary and needs justification for use.
- Any additional manufacturers' products will be added to the special specification after NYSDOT's evaluation of the design and successful proof load testing.
- Any manhole cover on the approved list may be used.
- Asphalt Pavement Supported Manhole Frames shall not be installed on pavement grades greater than five percent.
- The upper frame and cover portion of the manhole frame shall only rest on the road surface, not on the guide frame or concrete slab/wall of the manhole.
- By eliminating differences between the cover elevation and the pavement elevation, ride quality is maintained and damage to the asphalt pavement surrounding the manhole frame is minimized.
- The top portion of the Asphalt Pavement Supported manhole frame has a broad lip that allows it to rest on the pavement and distribute the vehicle load. This method of support allows it to move up and down with frost heave cycles. The design also allows convenient adjustment of the top elevation when overlays are done.
- The lip will be clearly marked with the words "Pavement Supported" or something similar on the top.
- Asphalt Pavement Supported Manhole frame may be considered as an alternative in areas where there is expected to be a high frequency and magnitude of freeze/thaw cycles or where frost heave has been a problem.
- Manufacturer shall cast a slightly raised, upright triangle into the inner surface of the lower frame. This triangle shall project 1/16" from the inside face of the frame. In addition, the triangle shall have a base width of 1" - 1 ¼" and an apex width of ¼". The apex shall be 2" below the top edge

Installation Procedures – Retrofit Application

Step 1. Install Guide Frame

Step 2: Backfill Guide Frame

Step 3: Compact Backfill

Step 4: Install Upper Frame

Step 5: Fill Remaining Asphalt

Step 6: Compacting

Step 7: Compact Unit

Installation Procedures – Total Resurfacing

Step 1. Install Guide Frame

Step 2: Backfill Guide Frame

Step 3: Compact Backfill

Step 4: Asphalt (top coarse)

Step 5: Lift Upper frame

Step 6: Clean cover

Step 7: Compacting

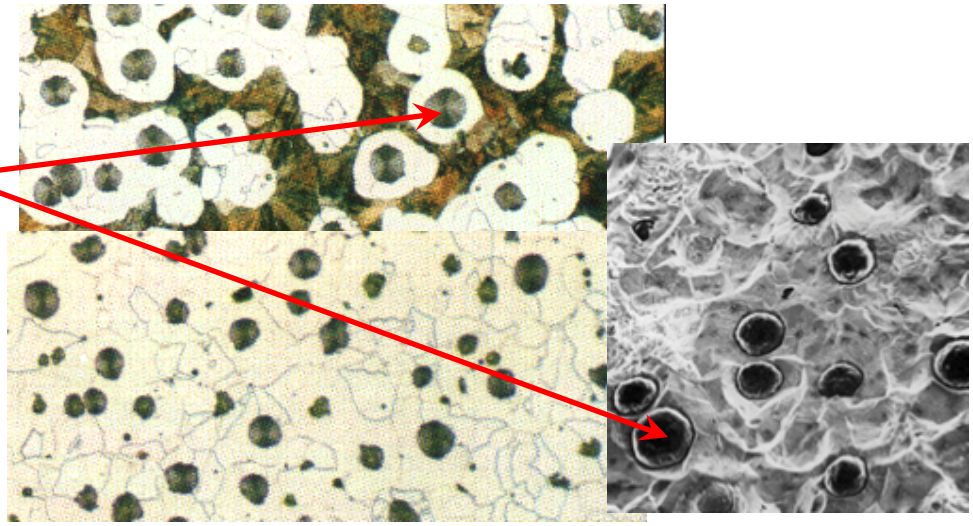
Materials

Gray & Ductile Iron

Pictures of: nodular (ductile) iron and flake (gray) iron.

DUCTILE IRON

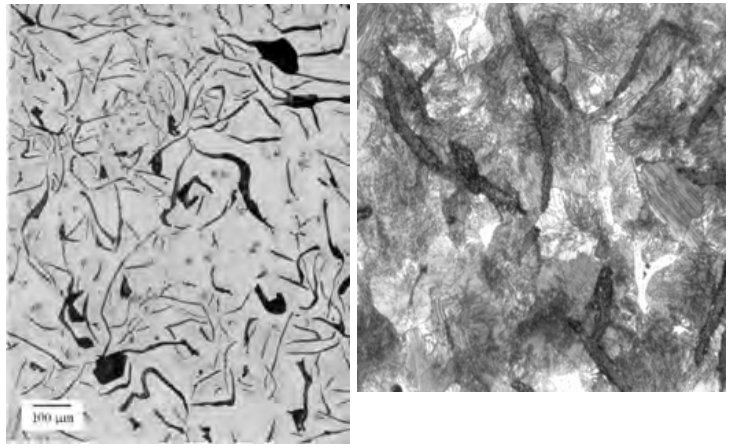
Low Sulpher plus Magnesium changes Ductile iron's surface tension as it solidifies resulting in ball shaped carbon within the iron

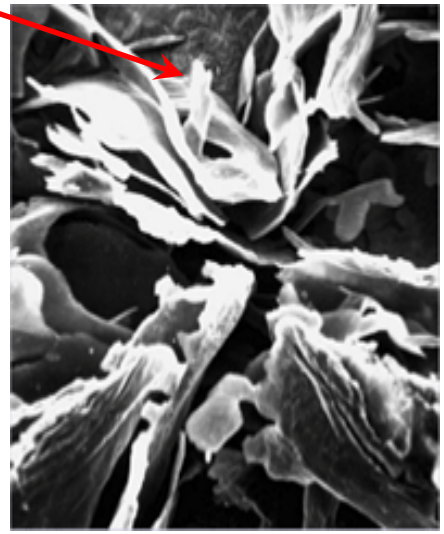


Gray Iron

During Gray iron solidification the graphite solidifies as a flake.

Visualization: a bowl of "Wheaties" filled with molten wax helps visualize the flake structure of Gray iron





ASTM Standard: Material

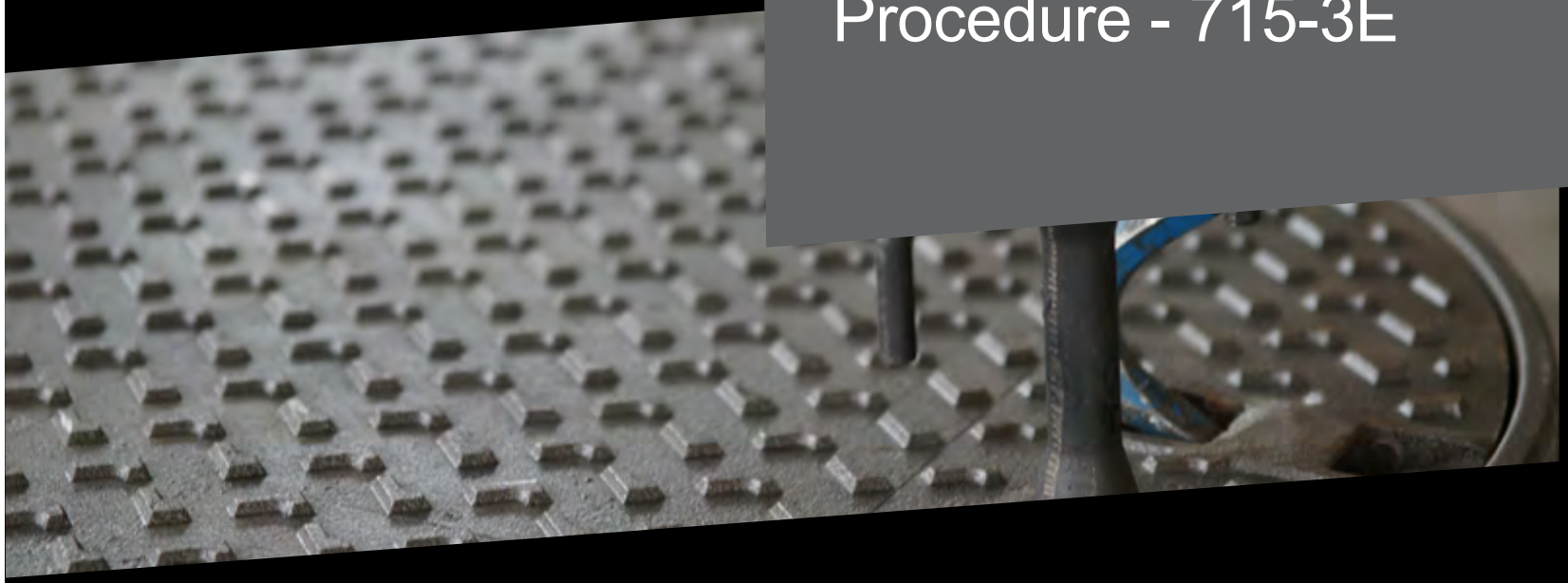
Materials

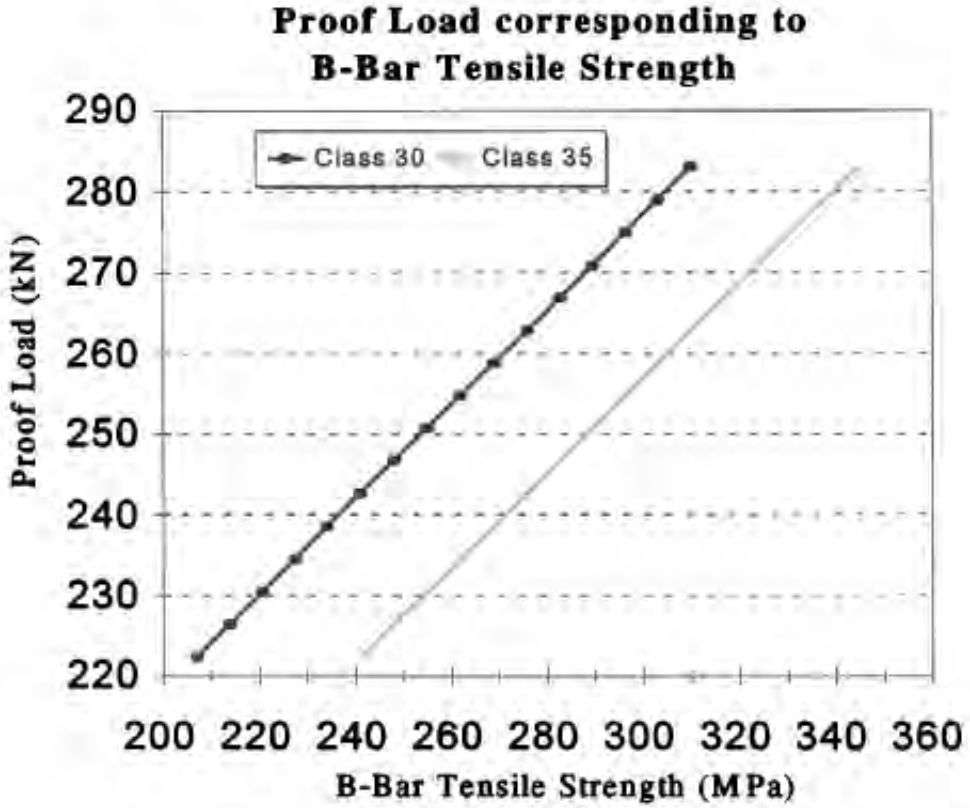
- Gray Iron:
  - ASTM A48 Class 35B
  - AASHTO M105 Class 35B
    - Tensile Strength: 35,000 psi
- Ductile Iron:
  - ASTM A 536 Grade 80-55-06 (Ardmore)
  - ASTM A 536 Grade 70-50-05 (East Jordan)
    - Tensile Strength: 70,000 psi
    - Yield Strength: 50,000 psi
    - Elongation: 5%

AASHTO Standard: M306-10

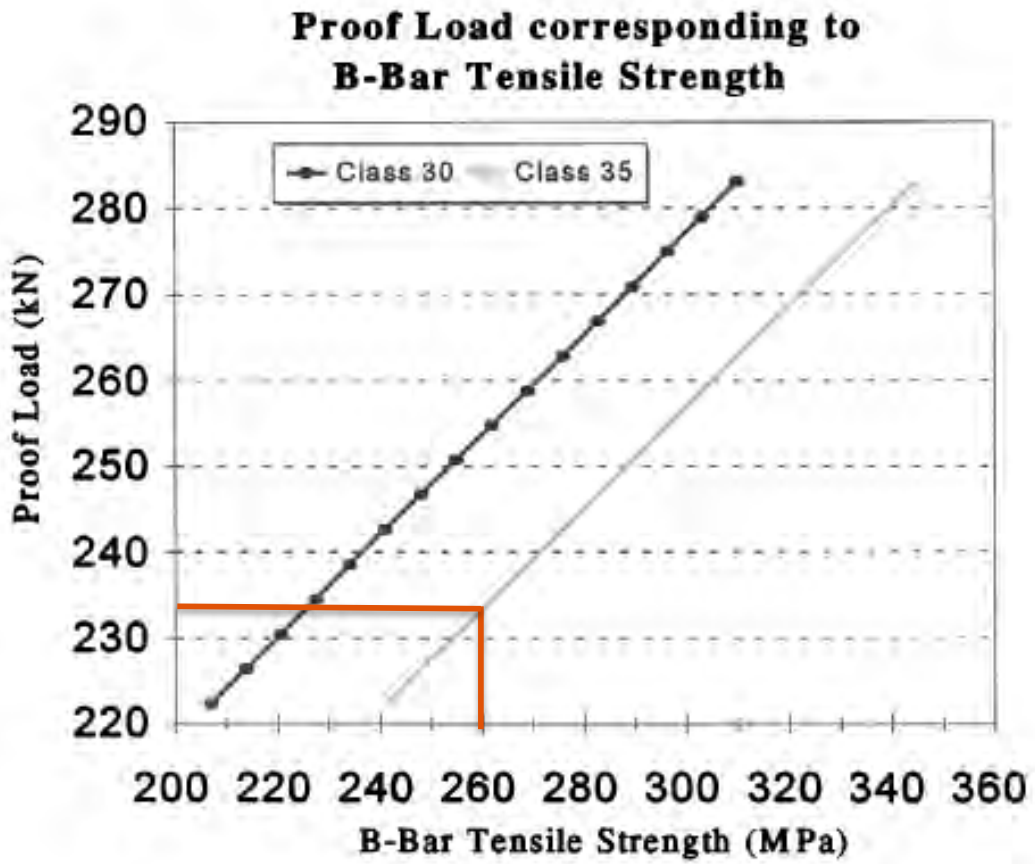
- AASHTO M306-10
  - AASHTO - American Association of State Highway & Transportation Officials
  - "Standard Specification for Drainage, Sewer, Utility, and Related Castings"
  - Scope 1.1
    - This specification is applicable to frames, grates, rings, and covers for inlet, manholes, and other structures for civil engineering use where items may be placed in traffic service and load bearing is a consideration.

NYSDOT Proof Load Test Procedure - 715-3E





Class 30: Proof Load (kN) = 0.5895*B-Bar Strength (Mpa) + 100.4
Class 35: Proof Load (kN) = 0.5895*B-Bar Strength (Mpa) + 80.3



EXAMPLE:

B-Bar strength = 260Mpa (37,710psi)

Required test load is then approx. 234KN (52,605lbs)

- This method is fair as it accounts for fluctuations in iron strength
- The DOT also checks for permanent set which can't exceed 3mm

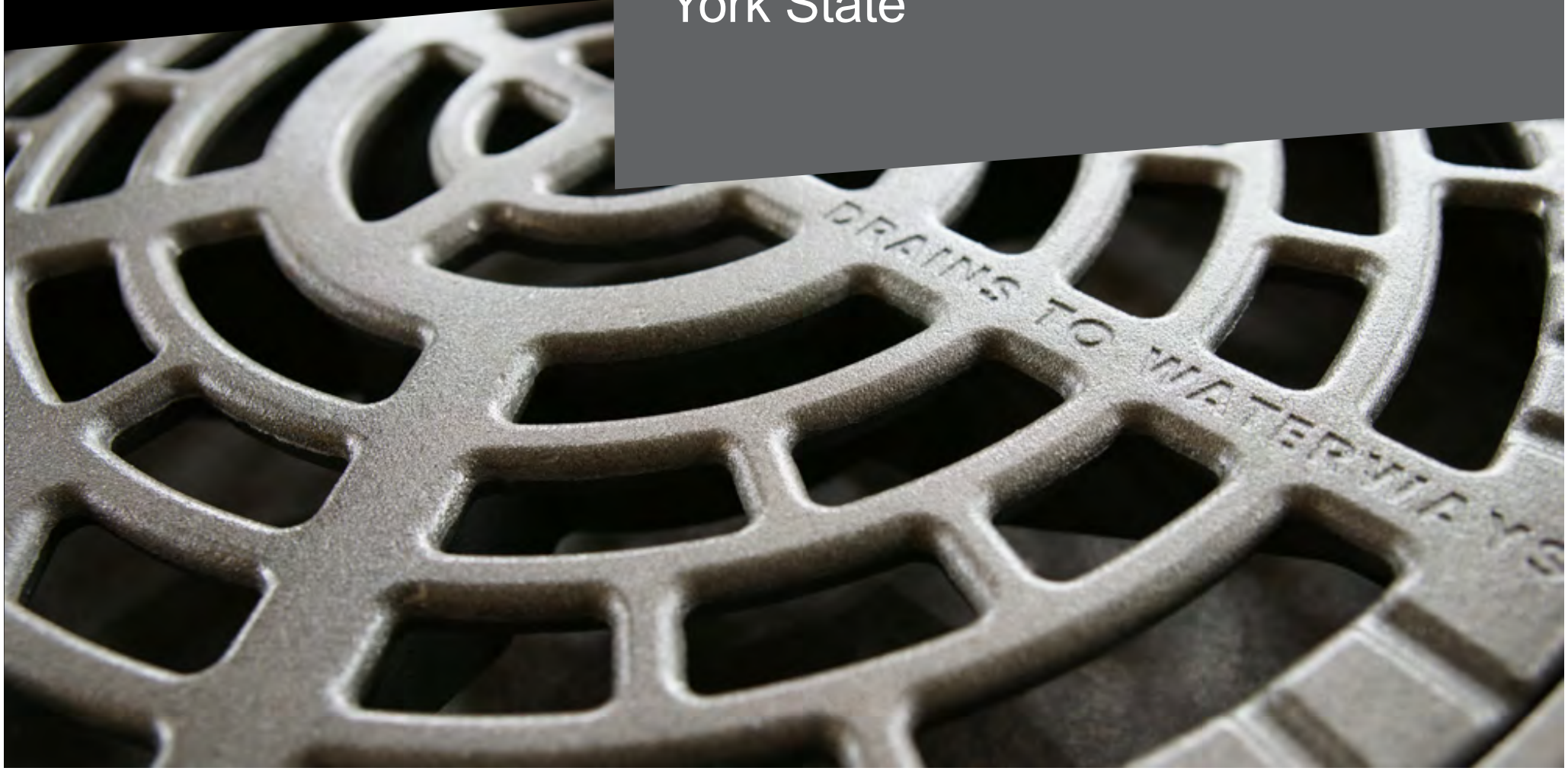
AASHTO Standard: M306-10

- H20 = 40,000lb Proof Load
- H25 = 50,000lb Proof Load
  - NYSDOT Standard for Ductile Iron is 50,000lbs

NYSDOT Load Test of the EJ SELF-LEVEL


301 Spring Street
East Jordan, MI 49727
231 536 2261

EJ SELFLEVEL® Installs in New York State



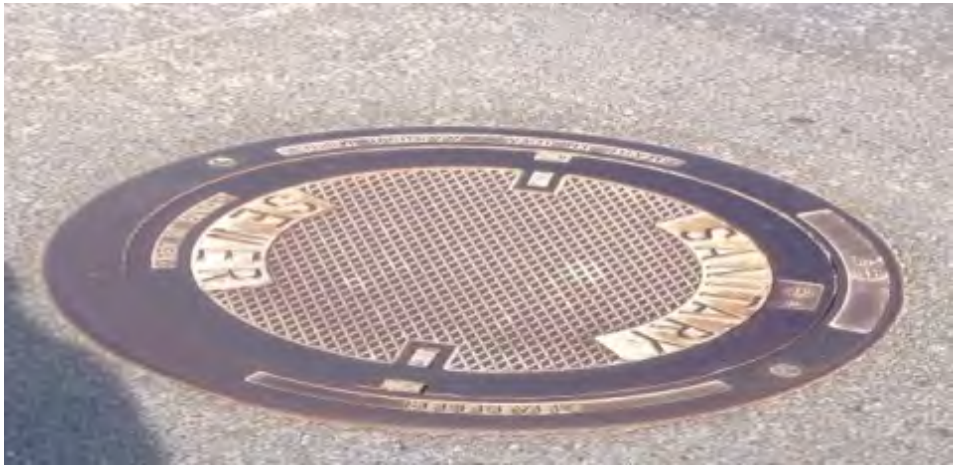
Installation

- 430 EJ SELFLEVEL® units have been installed in New York State since 2013 – (170 in 2016, 231+ in 2017)
- Retrofit installations
  - Usually take between 1-2 hours
  - The hardest part is removing existing asphalt
- SELFLEVEL® units save time when being installed on a surface that is sloped, because when being paved the top frame will match the slope of the surrounding.

Fall 2013 – Watertown, NY

- Retrofit Installation
- 1 unit installed

Before



2015

2017

2016 – Watertown, NY
Factory Street

2016 – Watertown, NY
Factory Street

Fall 2014 – Cortland, NY

- Retrofit Installation
- 1 unit installed
- Note: Condition of asphalt not under our control

Fall 2017 – Cortland, NY

Summer 2015 – Elmira, NY

- New Installation
- 7 units installed

2016 – Elmira, NY

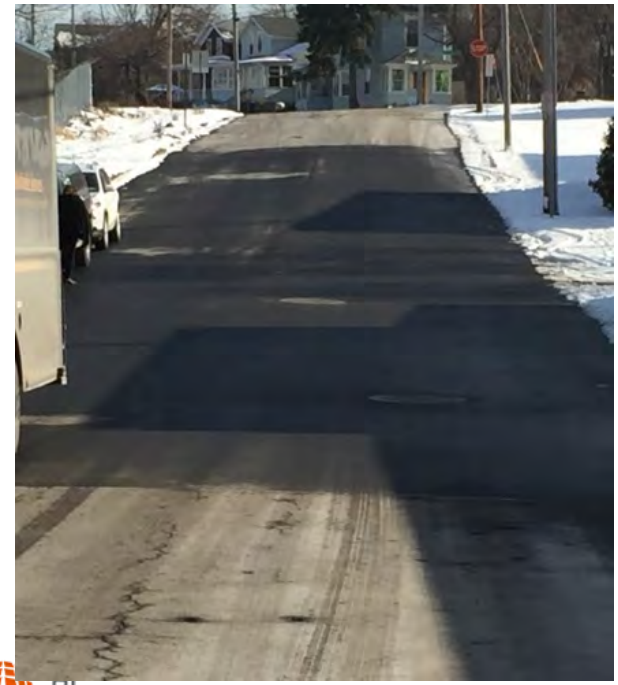
- City installed 30 units on their own, no assistance from the manufacturer.

2017– Elmira, NY

- City purchased an additional 95 units.

Summer 2015 – Syracuse, NY
Onondaga County Harbor Brook

- New Installation
- 12 units installed
- Emerson Ave
  6 units installed on steep slope



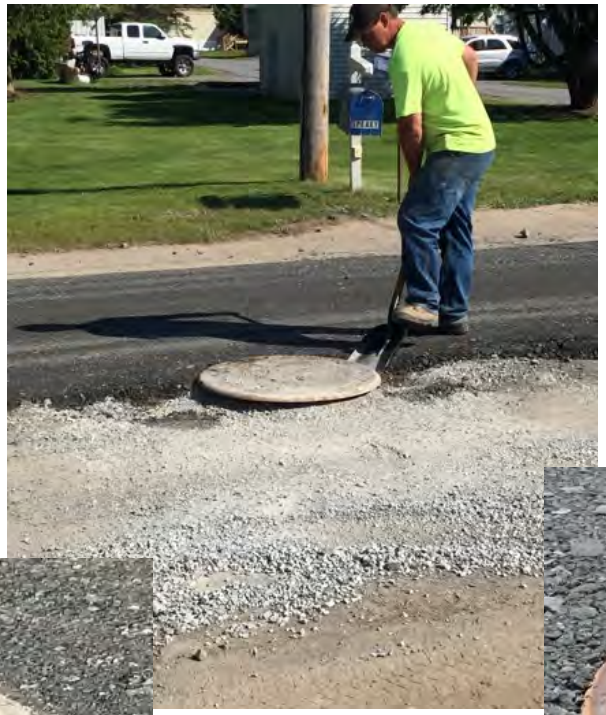
Fall 2014 – LeRay, NY

- New Installation
- 6 units installed
- 1st of 2 phases

Fall 2015 – LeRay, NY

- New Installation
- 9 units installed
- 2nd of 2 phases

2016 – LeRay, NY



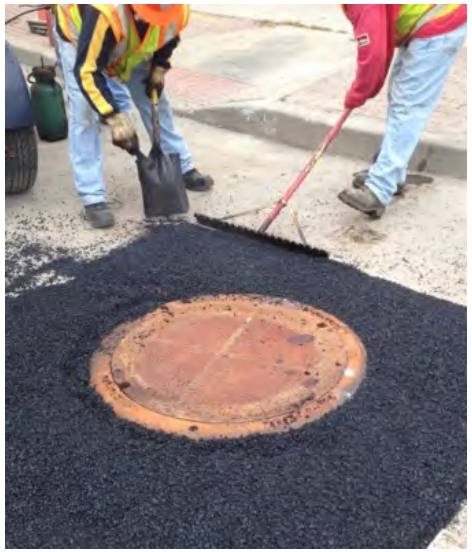
Fall 2015 – D262787 Tupper Lake, NY

- New Installation, Installed retrofit style
- 2 units installed
- NYS DOT Project

2016 – D262787 Tupper Lake, NY

Fall 2015 – NYS DOT Fultonville/Fonda, NY

- Retrofit Installation
- 1 unit installed
- NYS DOT project



Summer 2016 D263034 – Baldwinsville, NY

- New Installation
- 49 units installed
- NYS DOT project

Summer 2016 D263034 – Baldwinsville, NY

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Summer 2016 D263034 – Baldwinsville, NY

- SL & Standard

Winter 1/31/18 D263034 – Baldwinsville, NY

SELFLEVEL
Performing great after 2 years

Traditional Frame & Cover
Road damage after 2 years

Summer 2016 D263127 – Fulton, NY

- New installation
- 14 units installed
- NYS DOT project

ej

Fulton NY 2017 – 20 units installed by City

NYS DOT D263209 – Elbridge 2017

2016 – Kingston, NY 21 units

2016 – Chemung County, NY

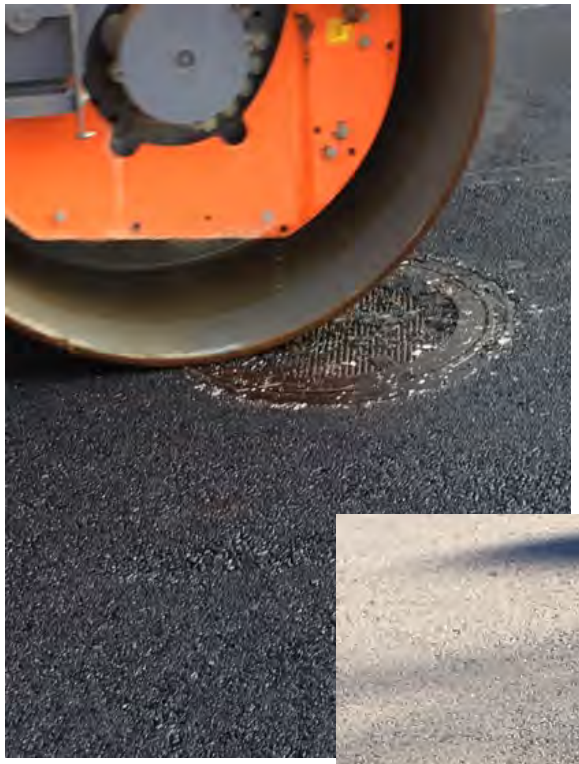
Sackets Harbor - 2017

Sackets Harbor - 2017

Port Leyden NY – 50 units

Hamburg DOT - 2017

2017 Saratoga Springs



Broadway & Church
across from City Hall

Other 2017 Self Level Installations

- Port Leyden NY – 50 units
- Palmyra NY – 6 units
- NYS DOT Hamburg NY – 1 units
- Oswego NY – 2 units
- Weedsport NY – 3 units
- Cooperstown NY – 8 units
- NYS DOT Oneida NY – 8 units
- City of Oneida – 1 unit
- Saratoga Springs NY – 1 unit
- Fredonia NY – 5 units

2018 Self Level Installations

- NYS DOT D263337 Oswego – 25 units
- NYS DOT D263503 Vestal NY – 1 unit
- NYS DOT D263597 Watkins Glen – 7 units
- NYS DOT Hamburg NY – 10 units
- Auburn NY – 95 units
- Elmira NY– 100 units
- Lowville NY – 103 units
- Watertown NY – 25 units

NYS DOT D263337 Oswego RT. 104

Auburn NY – 95 units

Con Edison Installations

2008 – 25 units installed

2015 - 95 units installed

2016 - 120 units planned for installation

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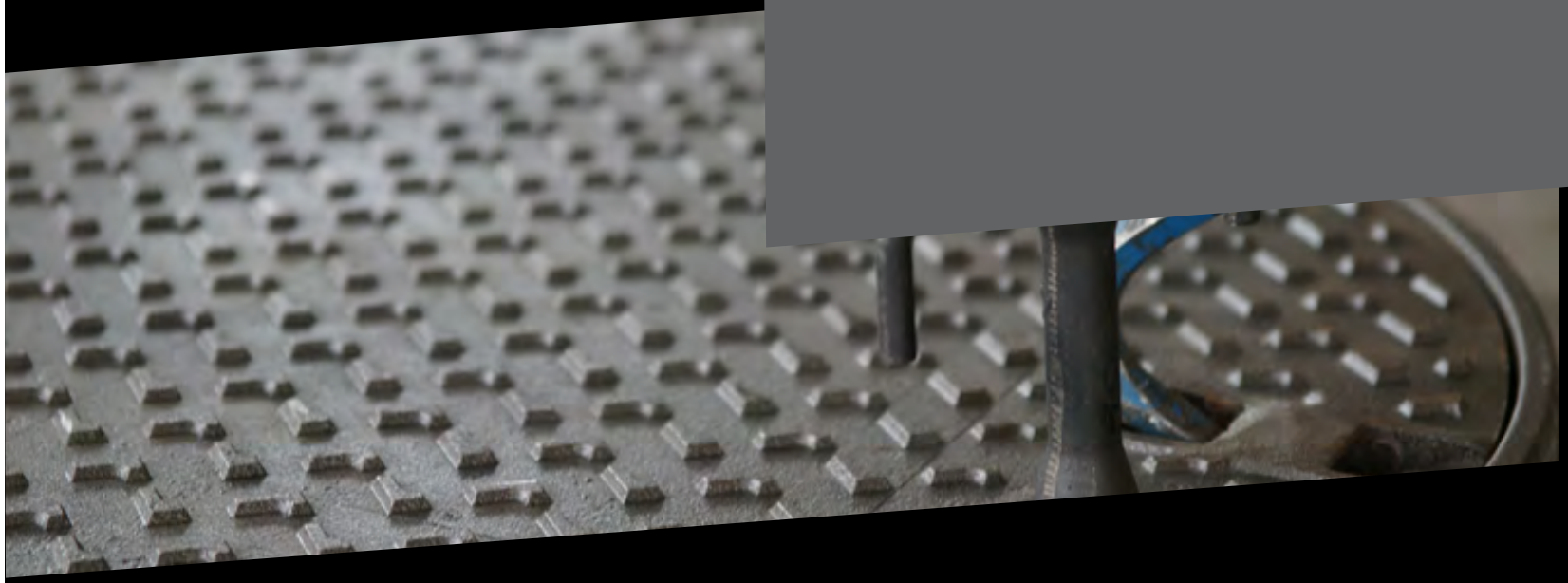
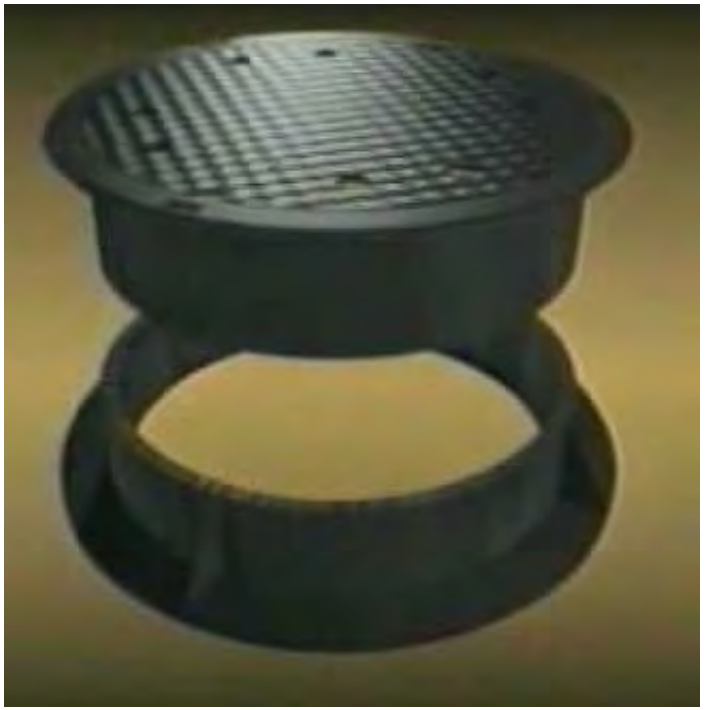
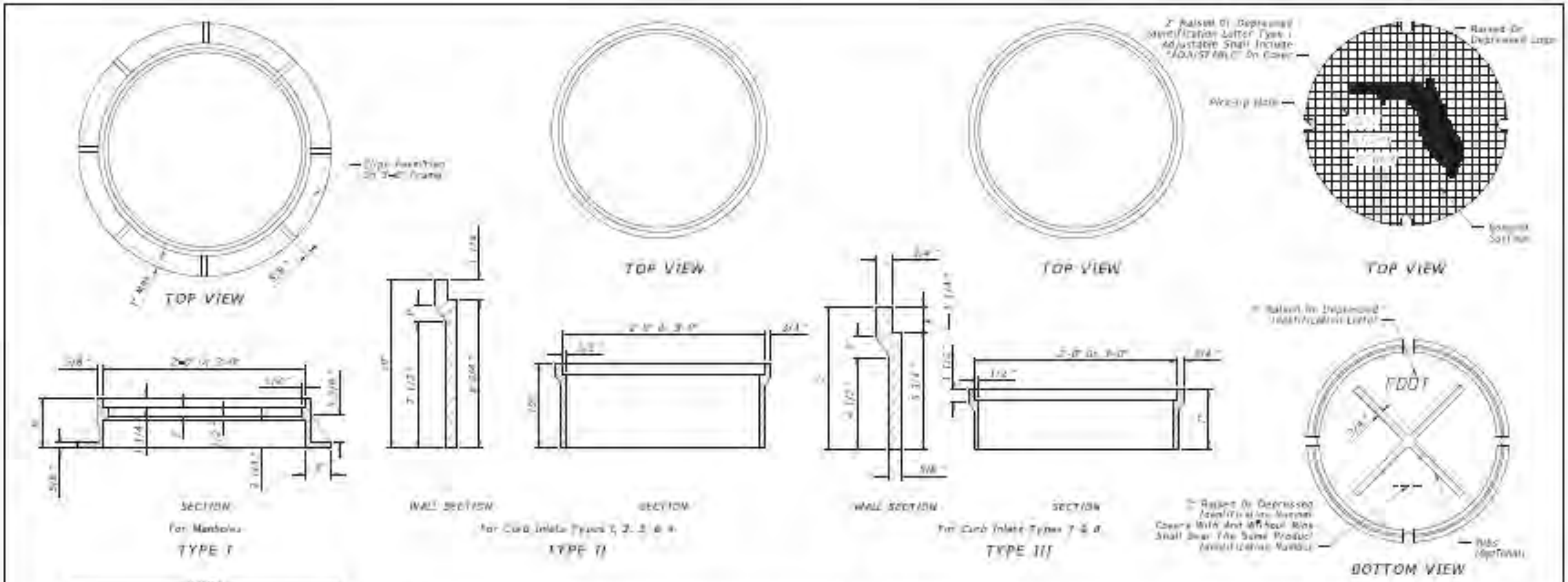
Not New Technology

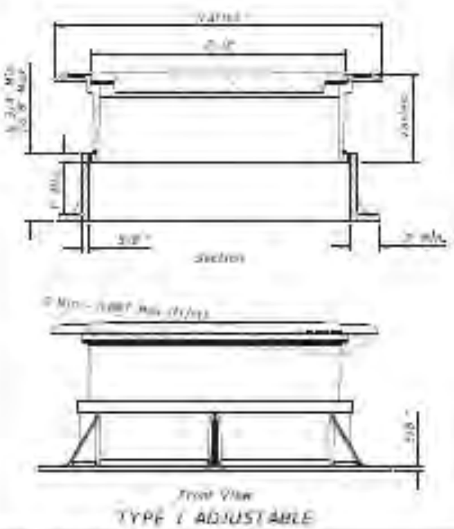


Wide Spread Use Globally

- The Self Leveling technology has been in use for approximately 20 to 25 years
  - Europe
  - Canada
  - Upstate, NY. & NYC.
  - Kansas City, MO., etc.







WEIGHT OF CASTINGS (lb)						
Frame Type	2' OPENING		3' OPENING			
	Frame	Cover (Std.)	Frame	2-Piece Cover		
				Inside	Outside	Total
I *	155	190	220	190	220	410
II	145	190	255	190	220	410
III	90	150	180	190	220	410

* Includes Type I Adjustable

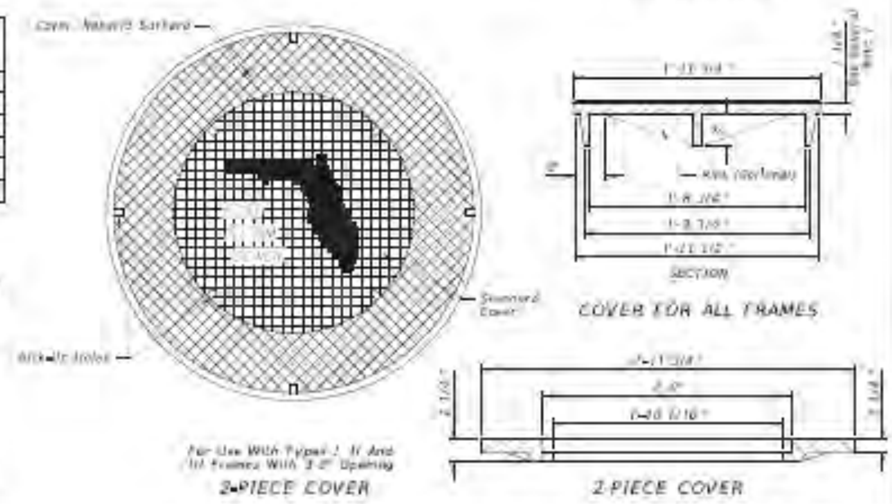
NOTES (FRAMES AND COVERS)

1. [illegible]

2. [illegible]

DESIGNER NOTE

[illegible]



LAST REVISION	REVISION	DESCRIPTION:	FDOT 2015 DESIGN STANDARDS	SUPPLEMENTARY DETAILS FOR MANHOLES & INLETS	INDEX NO.	SHEET NO.
01/01/12					201	1 of 5

Smooth Streets Solution for Kansas City

- Smooth Streets Initiative
- SELFLEVEL
  - Test install in 2009
  - First permanent units installed fall 2010
- Current specification:
  - Use SELFLEVEL whenever a manhole cover is being repaired

Smooth Streets Solution for Kansas City

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Wednesday, July 3, 2013 - 14:22

On the level: New manholes keep Kansas City streets smoother

Traditionally designed manhole covers or other street castings can contribute to problems such as bumpier streets, affecting the quality of life in cities for pedestrians, cyclists and vehicle occupants. The SELFLEVEL® access assembly by EJ is an innovative solution, with easy installation, providing infrastructure coverage that remains aligned with the surface over time. Its unique design allows a range of movement and continuous alignment with the finished road surface.

The city of Kansas City, Mo., has the SELFLEVEL specified to be used whenever an existing manhole is being repaired, as part of its Smooth Streets Initiative. Likewise, any and all other utilities with a manhole in the street are required to do the same, including Kansas City Power & Light, AT&T, Time-Warner (fiber-optic cable) and Qwest/CenturyLink. The product is viewed as meeting two key criteria of the

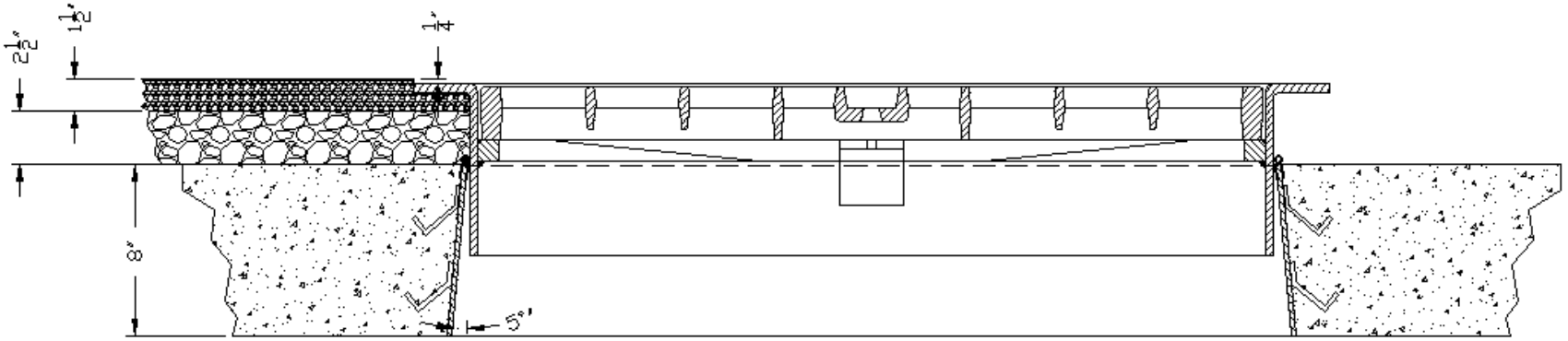
Smooth Streets Solution for Kansas City

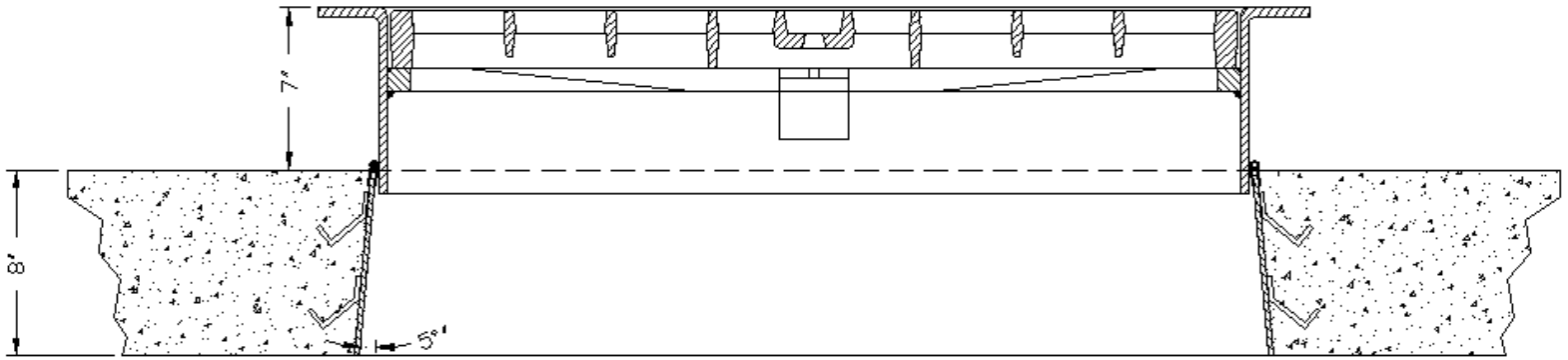
“The city of Kansas City, Mo., has the SELFLEVEL specified to be used whenever an existing manhole is being repaired, as part of its Smooth Streets Initiative. Likewise, any and all other utilities with a manhole in the street are required to do the same, including Kansas City Power & Light, AT&T, Time-Warner (fiber-optic cable) and Qwes/Centurylink. The product is viewed as meeting two key criteria of the initiative: it provides a solution for the effects of heavyweight vehicles in traffic, as well as for varying pavement slope resulting from the crown of the road.”

Smooth Streets Solution for Kansas City

“The product responds well to heavy traffic. Many are located in Kansas City bus lanes, with no failures reported. They meet MSHTO loading, as would be expected for heavy traffic locations.”

“Cost-benefits are based not only on road life and pavement integrity but also labor and material for a minimum of one to possibly three manhole adjustments with future pavement overlays/restoration.”

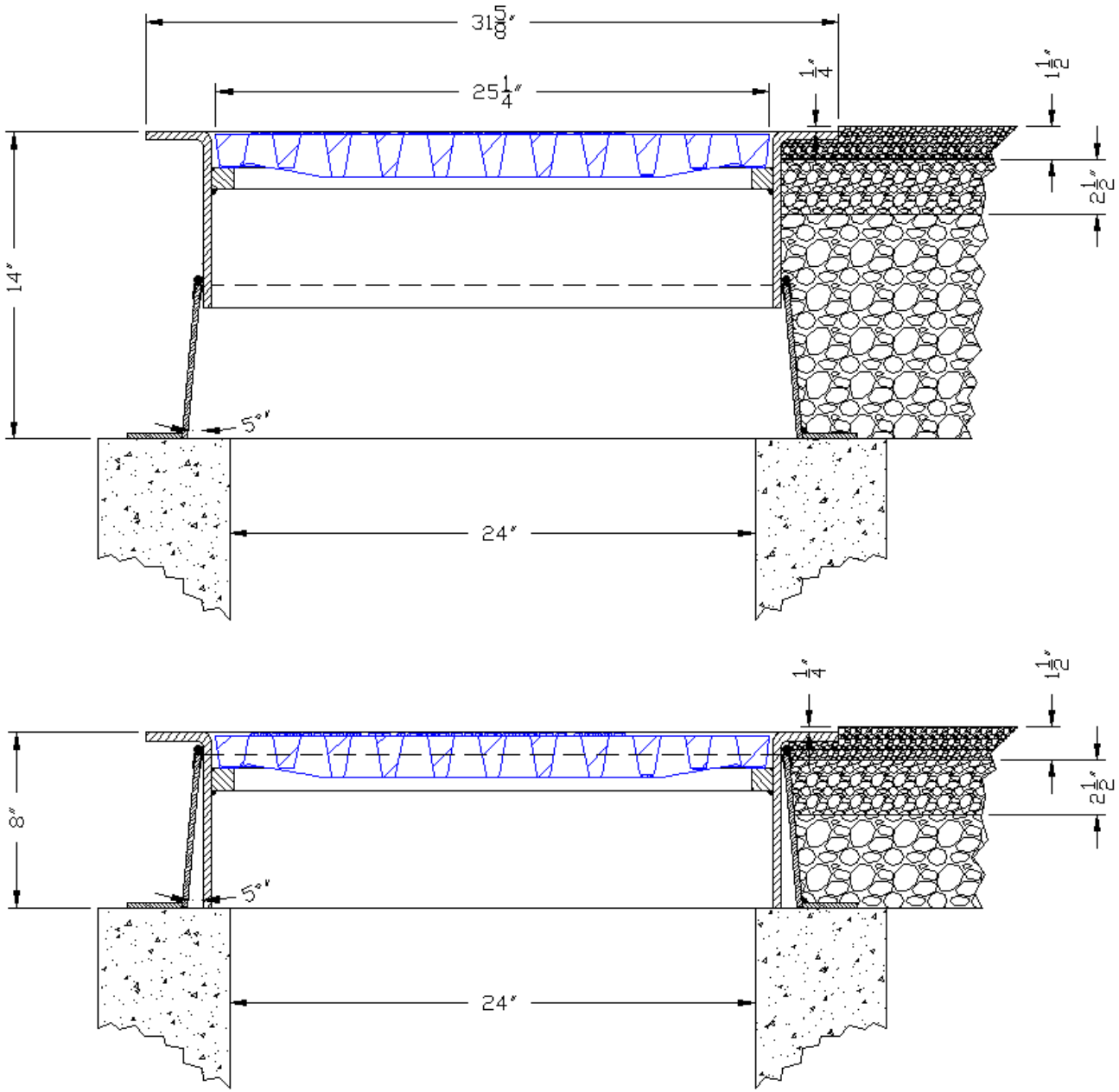

2½"
1½"
1¼"
8"
5"


7"
8"
5"

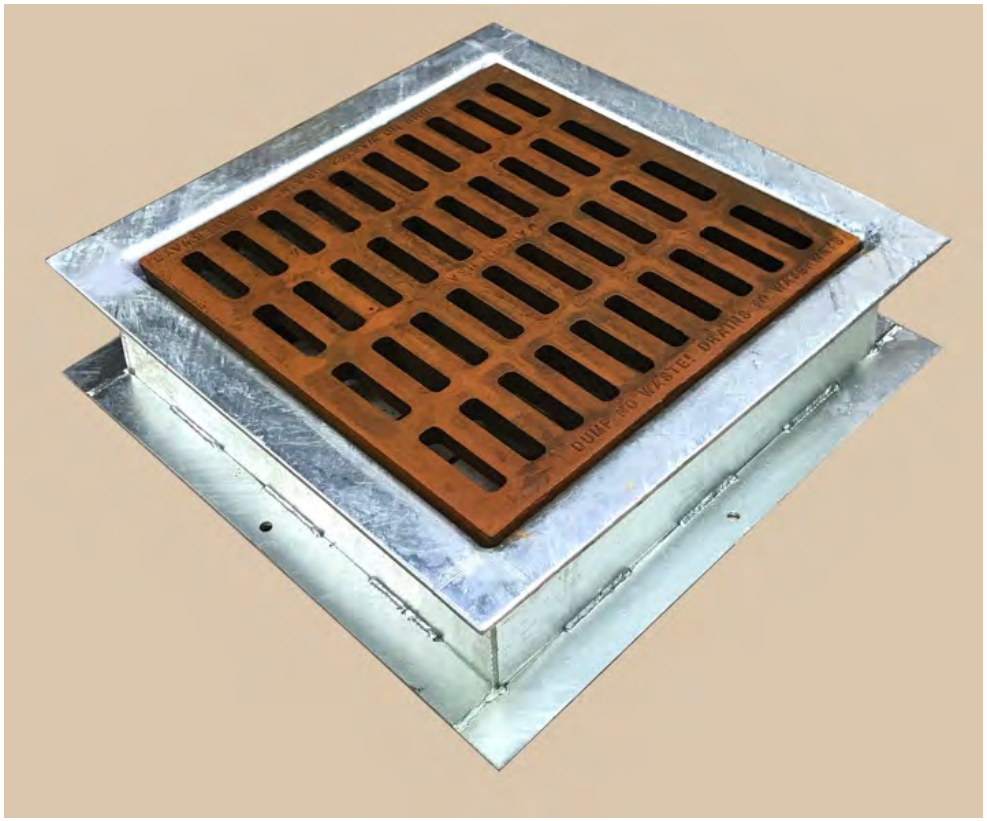
NYSDOT #11 Ductile Iron Grate


HD 141

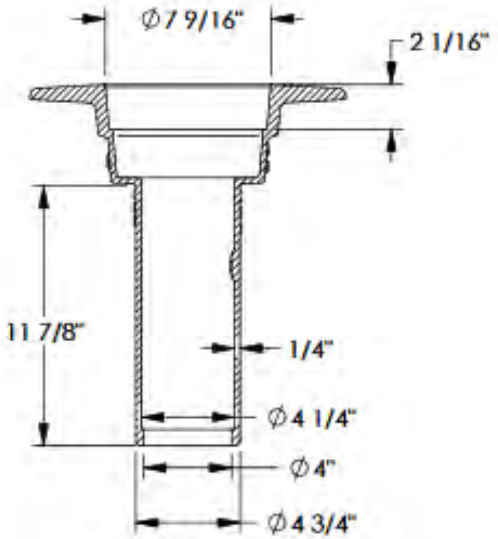
2 x 2 Self Level Frame &Ductile Iron Grate



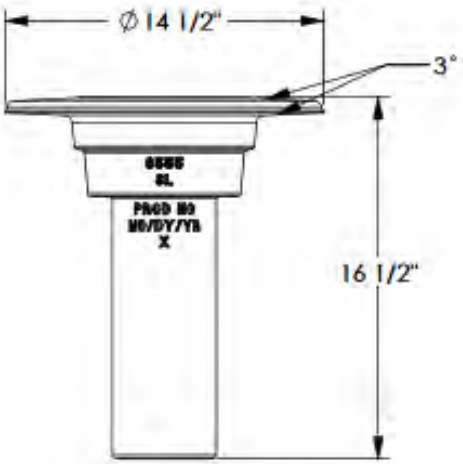
2 x 2 Self Level Frame &Ductile Iron Grate

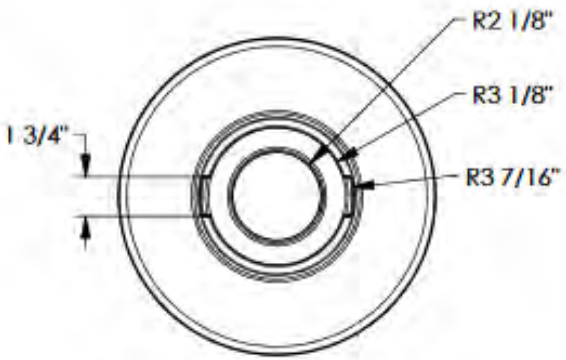


8555 SELFLEVEL Valve Box Riser



SECTION A-A





Product Number

85558008

Design Features

-Materials
Gray Iron (CL35B)
-Design Load
Heavy Duty
-Open Area
n/a
-Coating
Dipped
-√ Designates Machined Surface

Certification

-ASTM A48
-
-
-Country of Origin: USA

Drawing Revision

2/3/2017 Designer: DJH
2/22/2017 Revised By: MAH

Disclaimer

Weights (lbs/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact

800 626 4653
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We are EJ.