

2011-IESALC  
Wilmington, NC

# IES-2011

Wilmington NC

October 16-20

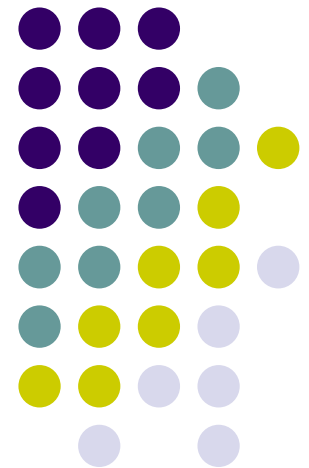
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## Airport Lighting Cans Load Transfer

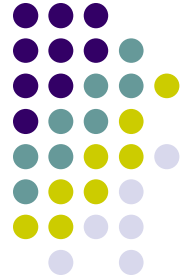
Presented  
By

**Daniel E Geary**

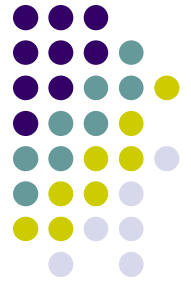
200 Norfolk Ave  
Norfolk, NE 68701



# Outline of Discussion



- Failures found in the field
- Why the failures happened
- What can be done about failures
- Constructability of installations



## Reminder

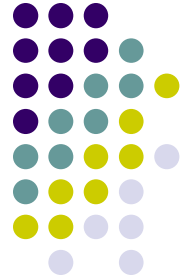
- The can installation must be in such a manner to transfer the aircraft load to the surrounding pavement
- The can by itself will not hold the weight
- The bolts by themselves will not hold the shear load
- The fixture or the snowplow ring will not take the whole brunt of the snowplow

# Installation is a Complete Unit



- Can
- Concrete
- Rebar
- Can extension
- Spacer rings
- Snowplow ring or Flange ring
- P-610, P-606, P-605

# Bolt Failure



- If the 6 3/8" bolts are used solely to take the shear load they can fail























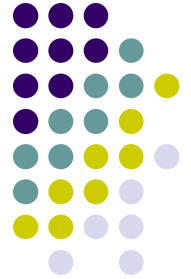








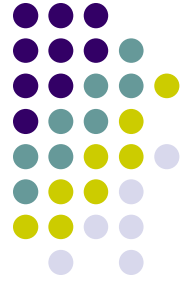
# Bolt Failure



- Adapter ring was not tied to the pavement
- Adapter ring was not indented into the can
- Shim rings compounded the problem



# Adapter Rings



- We have used adapter rings for a long time
- Many have been installed for a long time
- No problem





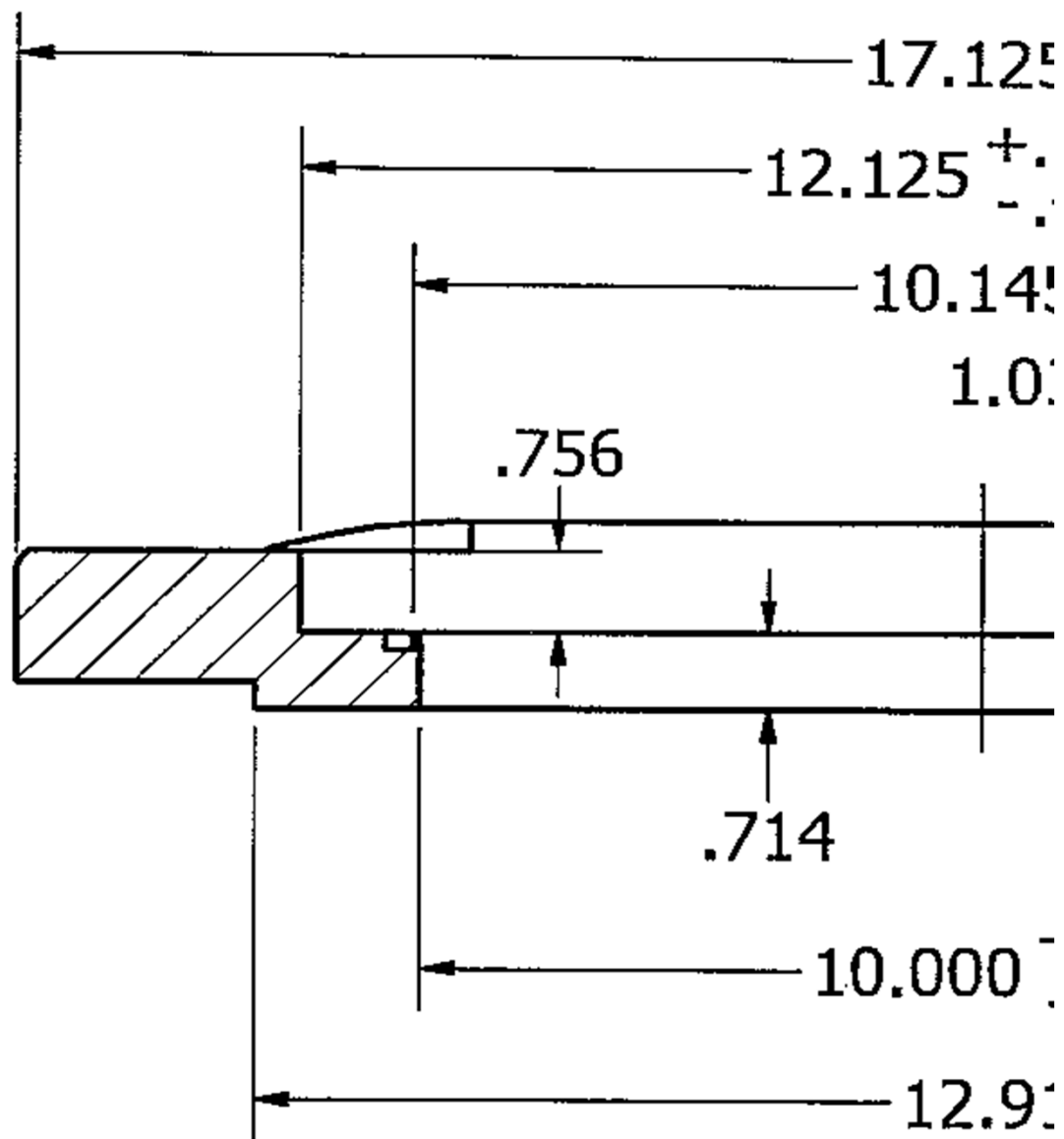
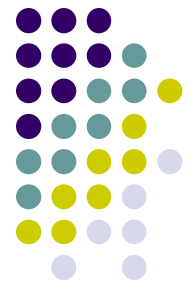


# Correct Installation



- Adapter ring was machined with a indent that matched the top of the can
- When installed the adapter ring set down inside the can and locked the ring to the can
- The bolts held the can down but the shear load was carried by the can
- Also note there is one set of bolts to hold the ring to the can and another set to hold the fixture to the ring







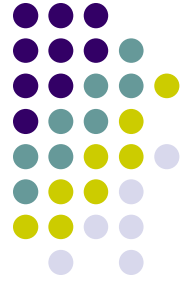








# Top Section Failure



- Fixtures slowly sinking into the pavement
- Some down far enough they were patched over with asphalt
- Some were repaired by drilling under the can and injecting grout





# Observation



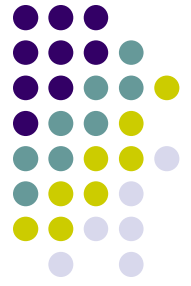
- Asphalt type paving
- No flange ring
- Fixture going down
- Asphalt breaking off the edge
- Fixture 1" below paving no light could get out









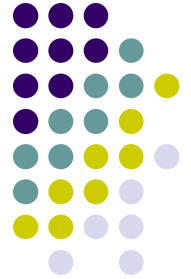


# Problem

- Can extension or top can was up to 16" long
- Question ? How long can a top section be?
- Normally the bottom can is concreted in and is only 6" to 7" max to top of paving finish surface
- Most asphalt installations the concrete of the bottom can is within 4" to 5" of the finish surface



# Normal Load Bearing Can



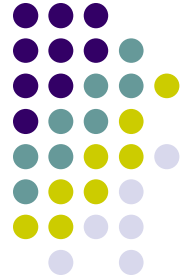
- L-868 can has a load bearing ring near the top of the can to transfer the can load to the pavement



# Airfield Cans



# Other Problem



- Can extension was installed with a flexible sealer









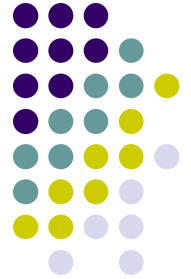


# What was wrong?

- Too long of extension
- Extension not tied into the pavement
- Load was not transferred to the pavement
- Can failed
- Possible if the can extension had a load bearing ring and the sealant had been a rigid rather than flexible the installation might have worked

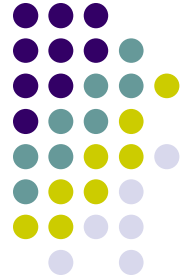


# New Designs

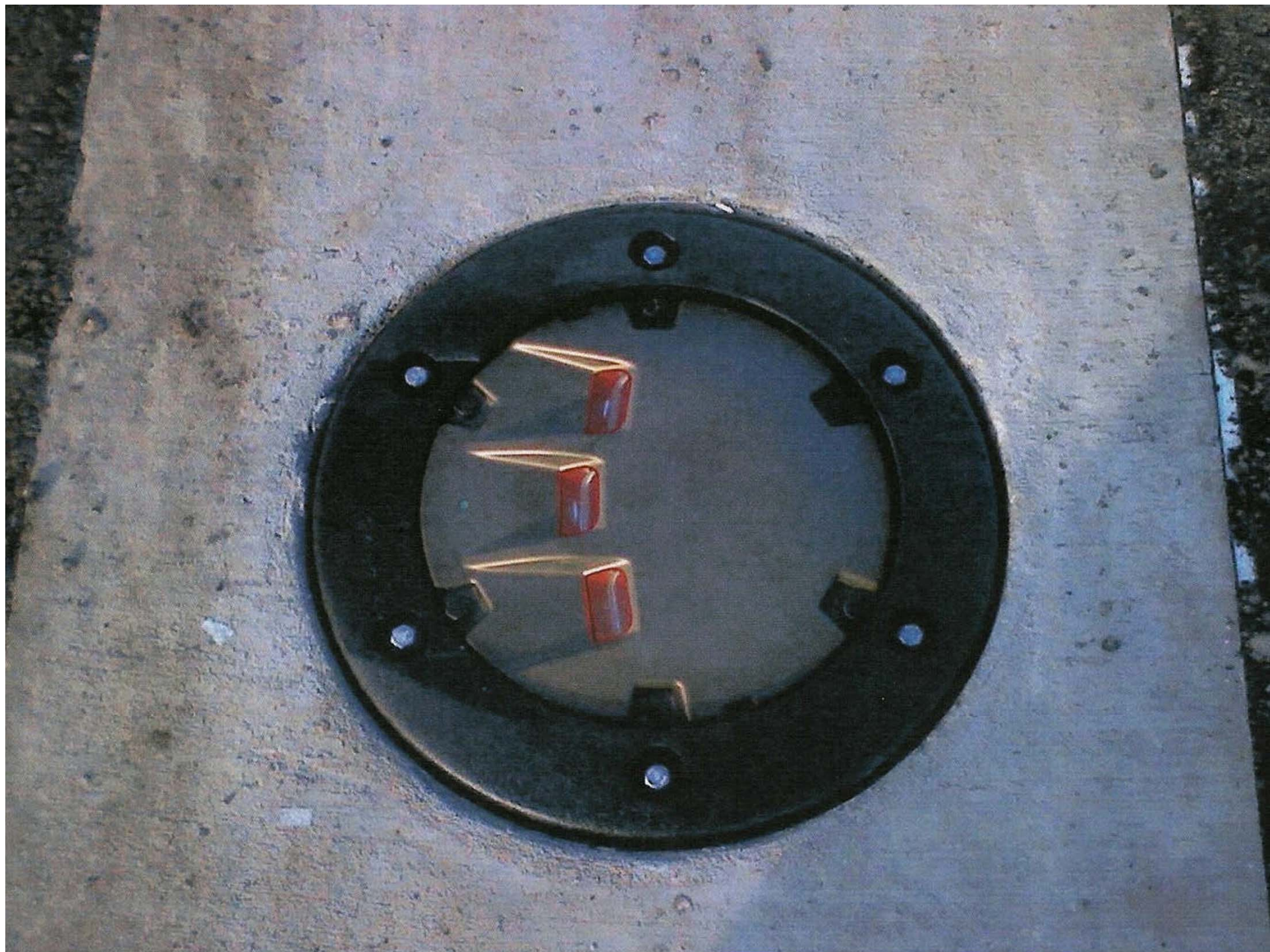


- With these failures in mind lets look at new installation details

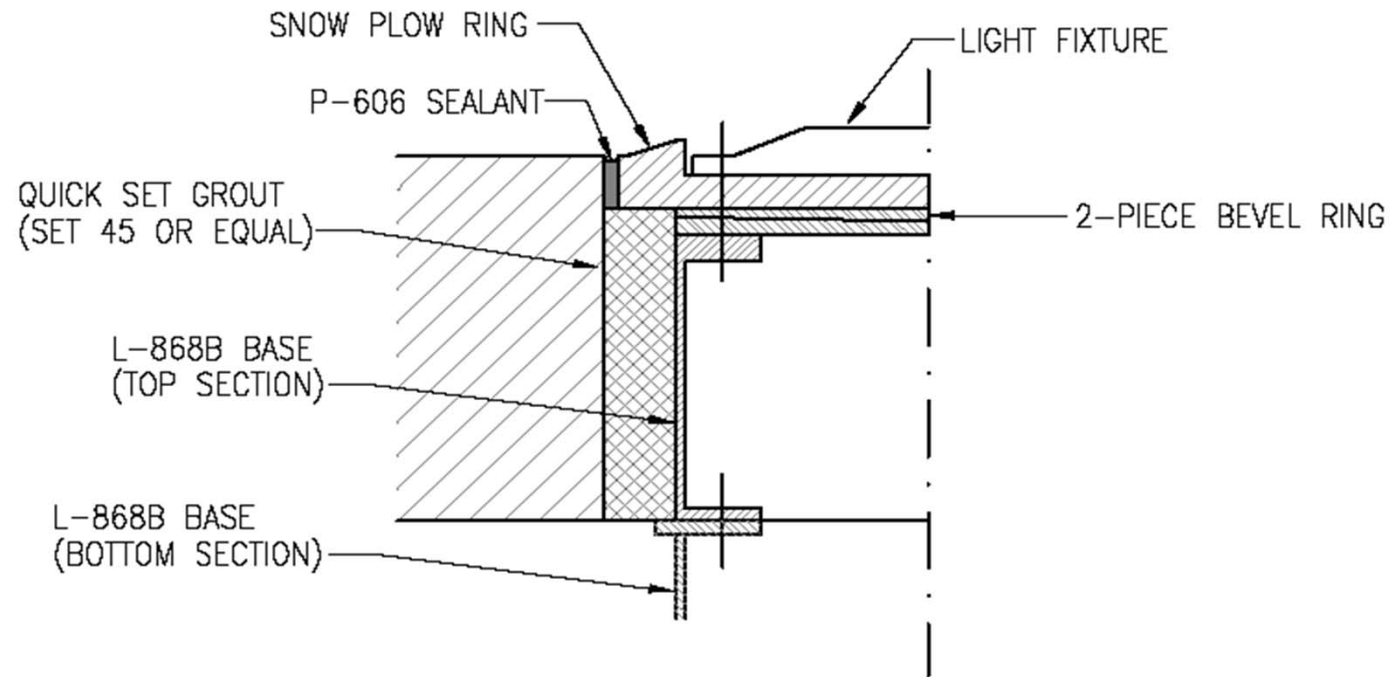
# Snowplow Ring Installation







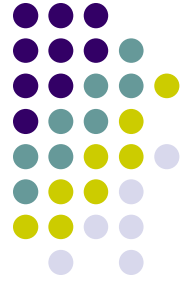
# New Installation – Asphalt Overlay



**DETAIL A**  
NOT TO SCALE

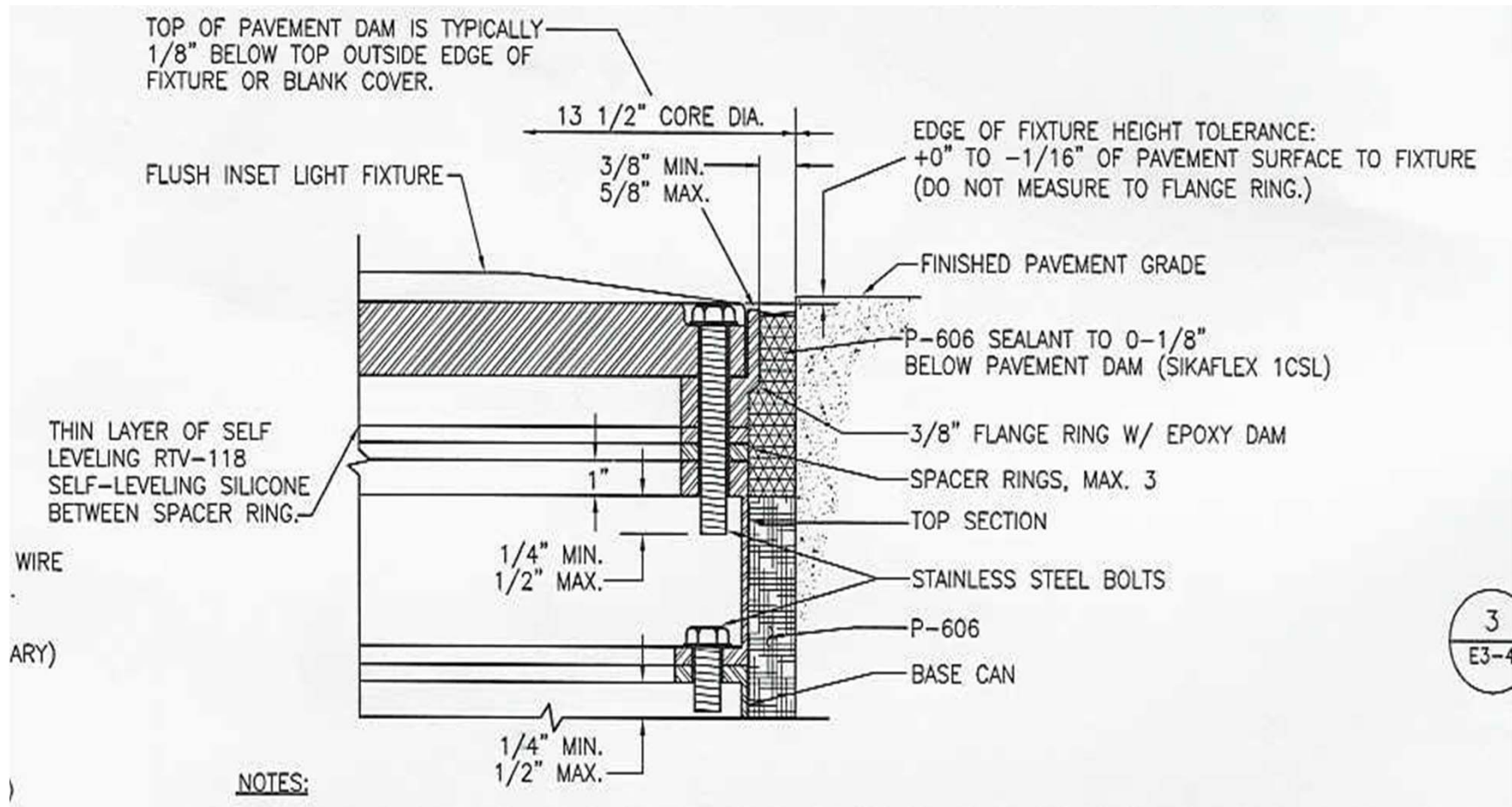
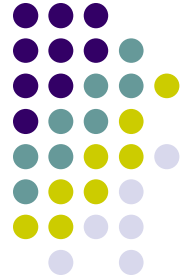


# Snowplow Ring Installation

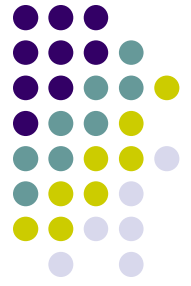


- Detail is not in proportion
- Snow plow ring is 15.75" in diameter
- Can is a 12" can
- Cored hole is 16.25"
- Space on each side of top section is 2.125"

# Stainless Steel Bolts



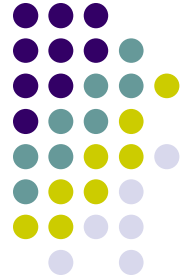




# Bolt Length

- .5" bolt length for fixture
- .5" bolt length for snow plow ring
- .75" bolt length for Bevel ring
- .75" bolt length for up to 3 spacer rings
- .75" bolt length to screw into can
- 3.25" bolts
- 2.5" of bolt that could have shear load

# What We Learned



- Only one set of bolts to hold both the snow plow ring and the fixture



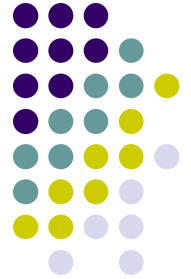








# New Installation

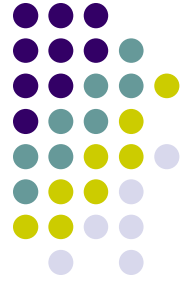


- We could have a bolt failure problem if the top can, spacer rings and snow plow ring are not properly tied into the pavement



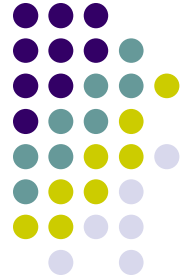


# Constructability



- Snow plow ring is 15.75" OD
- Core drill hole is 16.25"
- Specification read "Core drill approximately 16" dia hole (Leaving small annular space between snow plow ring and surrounding pavement)"
- Space on each side of the snow plow ring is .25"

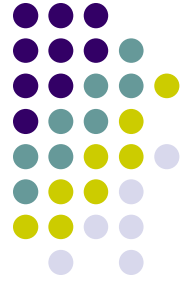
# New Installation



- To get the P-610 in the space around the top section the snow plow ring will have to be removed
- The p-610 or grout cannot be pushed in the .25" space around the edge
- The snow plow rings are specified with pin that go into the grout

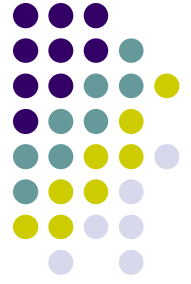


# New Installation



- To install the grout the spacer rings, and the bevel rings will have to be laid in place
- The bolt holes will have to be lined up
- Just the exact amount of grout will have to be poured in to the top of the bevel rings
- The snowplow ring will then be installed

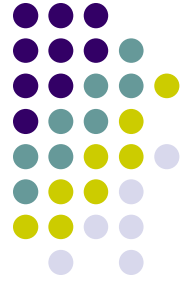
# New Installation



- If a little too much grout is used it will squeeze between the spacer rings run in the can and get on the bolts
- If a not enough grout is used the ring and spacers will not be grouted solid to the paving

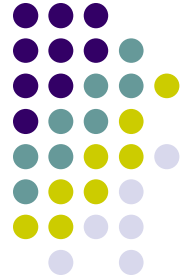


# In Perspective



- The work takes place at night during a runway shut down
- The penalty for not opening the runway on time is \$24,000 for the first 15 minutes and goes up from there
- The penalty for not completing the job on time is \$2500 per day
- Its dark its cold the wind is blowing and there is a threat of rain

# New Installation

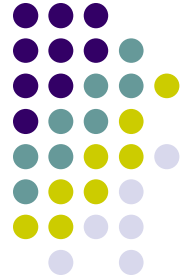


- The annular space between the snow plow ring and the pavement is filled with P-605 which is a flexible sealant





# Presenter Information



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