HydInfra Condition Ratings and Inspection Terms

HydInfra

- Hydraulic Infrastructure
- Inspect Culverts less than 10 foot span
- Inspect Storm Drainage System Features
  - Pipes,
  - Special Structures (aprons and others)
  - Structures (manholes, catchbasins)
  - Ponds
  - Ditches
  - SPCDs (Structural Pollution Control Devices)

Condition Code
defines the
Structural Integrity
of a feature
(is it broken? or not)

HydInfra Ratings Guide

Condition Rating Codes:

1 Excellent -- like new condition

2 Fair -- some wear, but structurally sound

3 Poor – deteriorated, consider for repair or replacement

4 Very Poor -- serious deterioration

0 Not able to rate, not visible

Inspection Flags Describe the Rating:

Condition Indicators

- –Needs Repair?
- –Piping
- –Cracks
- –Holes
- –Deformation
- –Misalignment
- –Joints Separated
- –Spalling/Flaking
- –Pitting/Rusting

Roadway Indicators

- –Void in Road
- –Road Distress
- –Inslope Cavitation
- –Erosion/Scour

Not in Condition Rating

- –Needs Clean?
- –Plugged
- –Silt
- –Standing Water

Condition Code does not include the need for cleaning

Need for cleaning is defined by:

- Clean = Y
- Sediment % Full = “30%” or greater
- Plugged = Y indicates severe problem
- Silt = Y indicates something is covering the pipe invert, not a need for cleaning by itself

Condition 1
means Repair is not needed

- Repair = No (always)
- Pipe is like new
- Most or all inspection flags are “N”
- Only the (non-structural) flags for Clean, Silt, Plugged, Standing Water can be “Y”

Condition 2 means Repair is not needed

- Repair flag = No (always)
- Pipe may be worn but is functioning okay
- Pipe has minor condition problems
- Some minor flags can = Y
  - for example: Pitting/Rusting, Spalling/Flaking, Cracks
- But NOT major problems
  - like Holes, Piping, Inslope Cavity, Road Void or Repair Under Road

Condition 3
Needs Repair

- Repair = Yes (always)
- Repairs are needed but road won't fail
- Repairs might wait for a construction project
- Condition flags should explain how the pipe is in poor condition

Condition 4
Needs Repair

- Repair = Yes (always)
- Condition flags should explain how the pipe is in poor condition
- Flags for Holes, Piping, Void in Road are clear indicators of Condition 4
- Inspection Comment can clarify condition rating

Condition 4 (continued)

- 4 is very bad!
- Repairs might be needed very soon
- Roadway may be in danger from loss of fill or from pipe deterioration

Condition 0 - Unable to Rate

- Repair flag should be left blank
- Feature cannot be seen to determine condition
- If you can see a problem to rate it condition 3 or 4, then don’t use 0
- “0” Pipe is submerged, buried or out of sight
- Flags for Clean, Plugged or Standing Water should indicate reason for 0
- Use comments

Repair Y or N?

- **Condition 1 – No**
- **Condition 2 – No**
- **Condition 3 – Yes**
- **Condition 4 – Yes**
- **Condition 0 – (blank)**

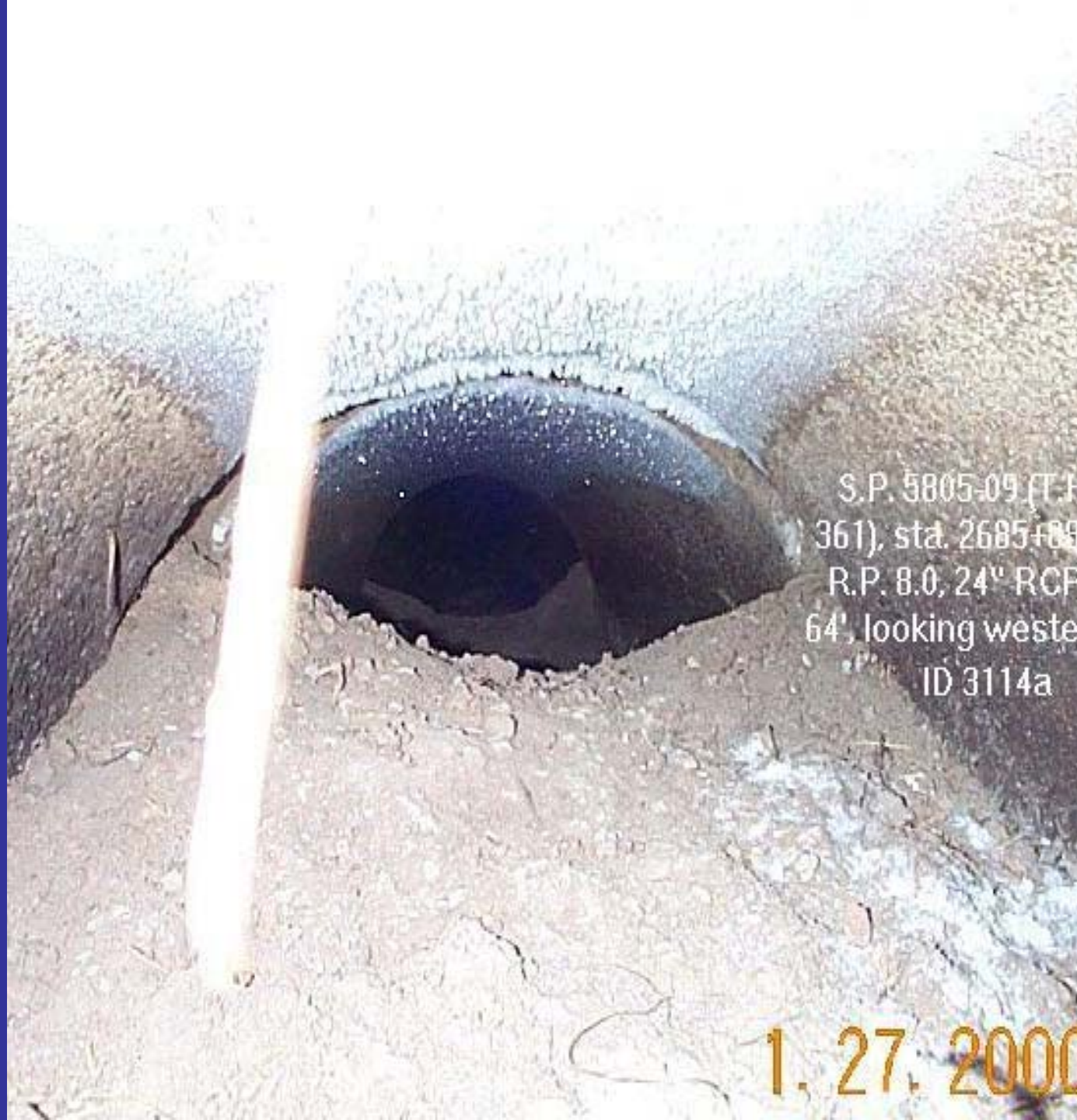
The **WORST** part of a Feature determines the Condition Rating

(Don’t use an average)

Inspection Terms
“Flags”

Clean

- Feature needs cleaning. Sediment or debris impedes drainage



Needs Repair

- Feature needs repair or replacement
- Use with Condition Rating 3 or 4

Standing Water

Standing water or running water in the feature

Silt – Deposit of material on invert of feature

Plugged

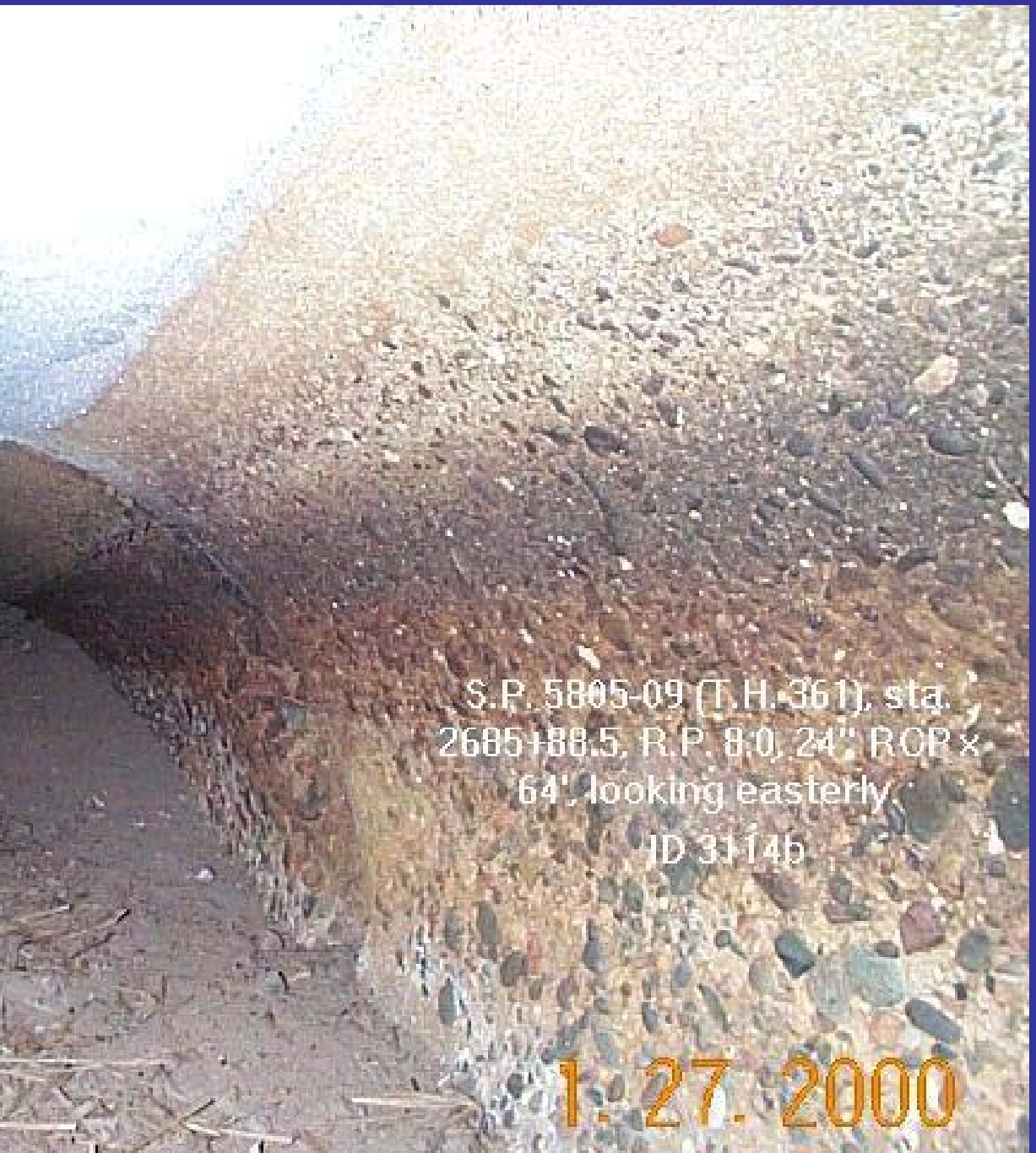
- Something is in pipe that substantially reduces or prevents water flow

Pitting/Rusting

- Superficial decay of surface material
  - Pitted if concrete
  - Rusty if steel
- Material is still solid

Spalling/Flaking

- Material has been lost
  - spalled chips of concrete
  - flakes of rust
- Material may have lost strength

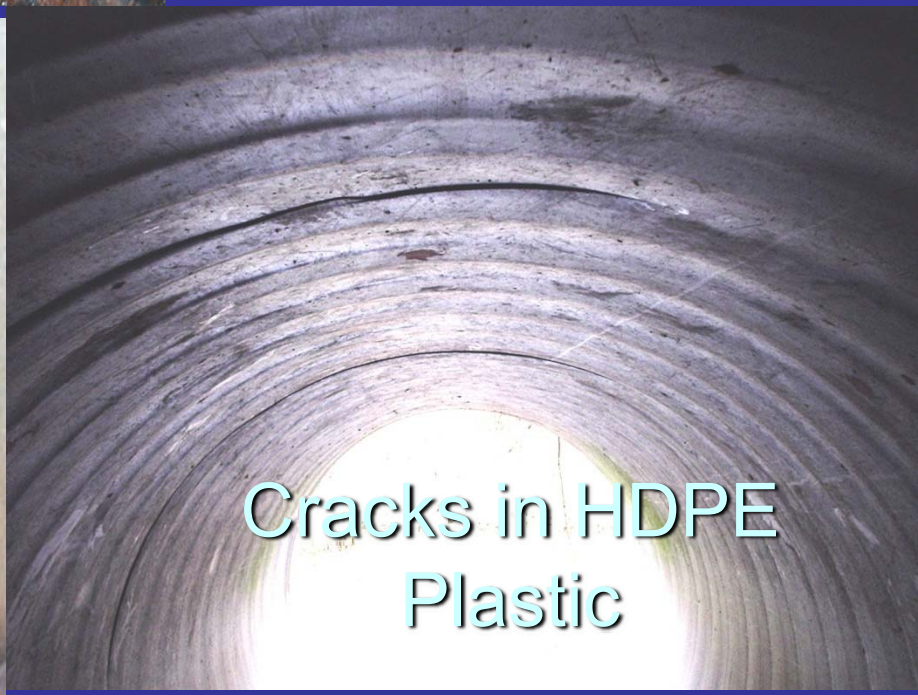


More like Spalling than Pitting

¼” or more depth of lost concrete

Cracks

- A visible crack

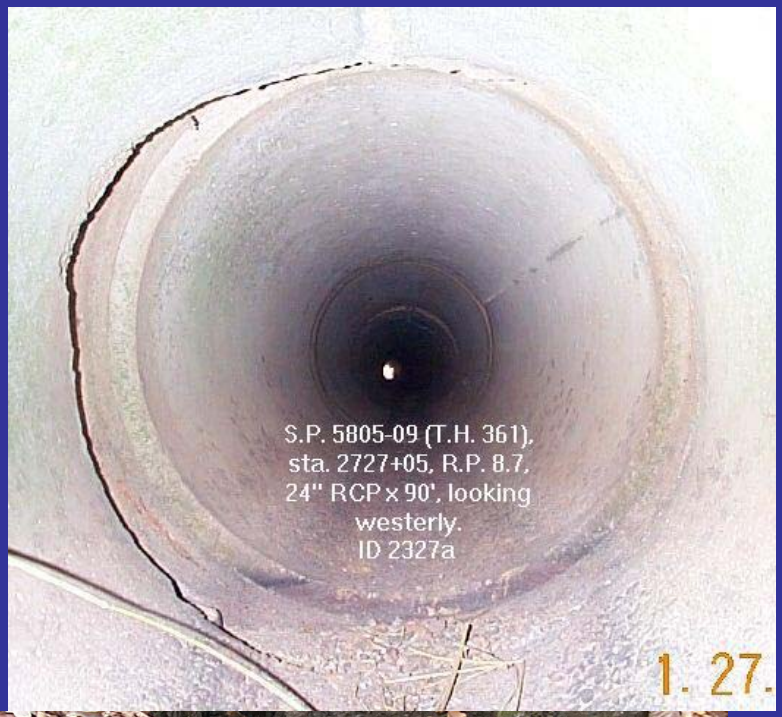


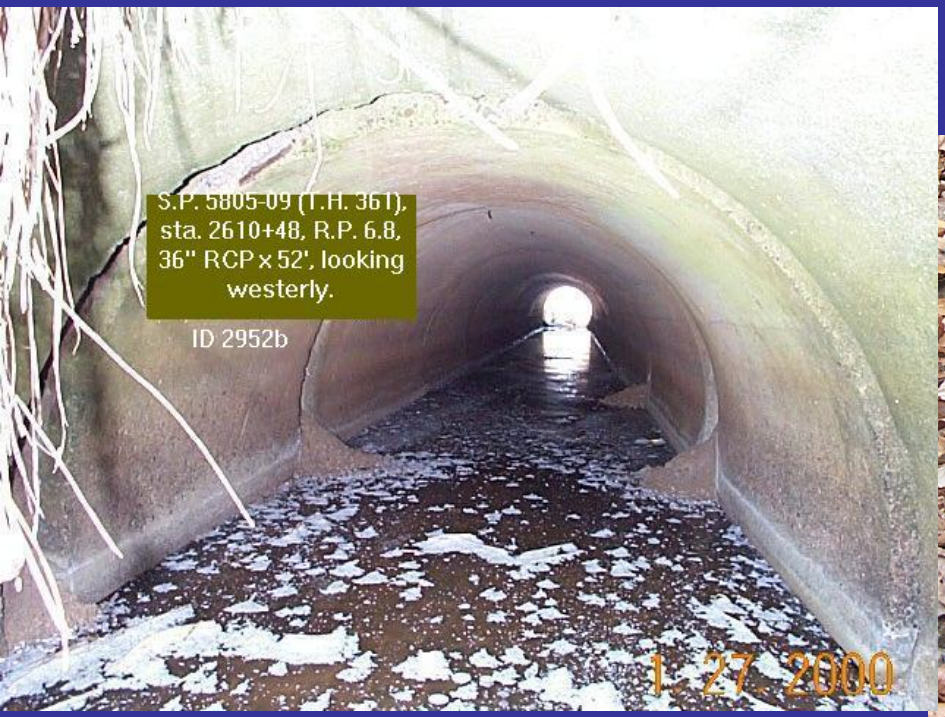
Holes

- Hole goes completely through a features material

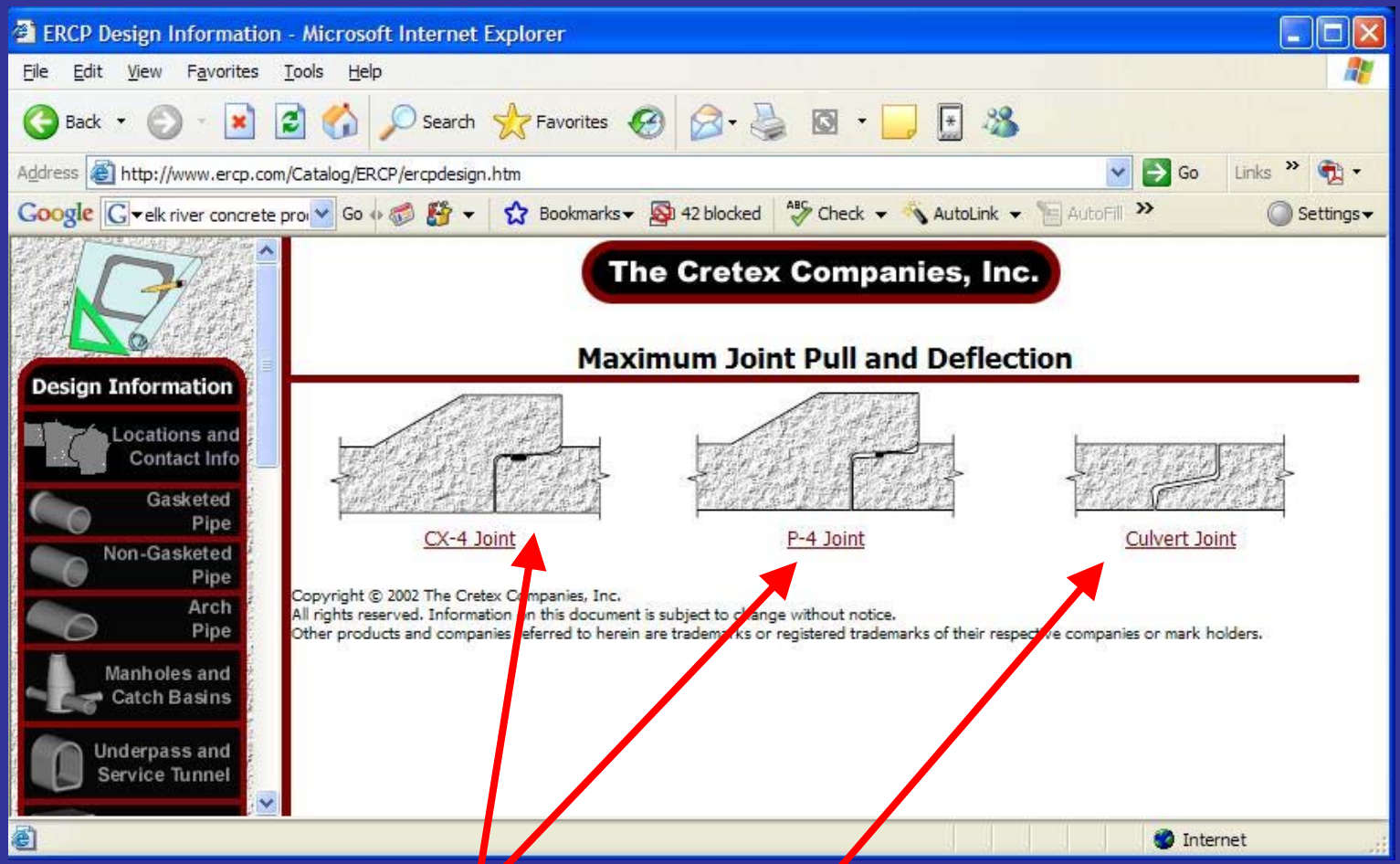
Joints Separated

- The joints between two pipe sections are separated (lengthwise) and may allow soil to filter through





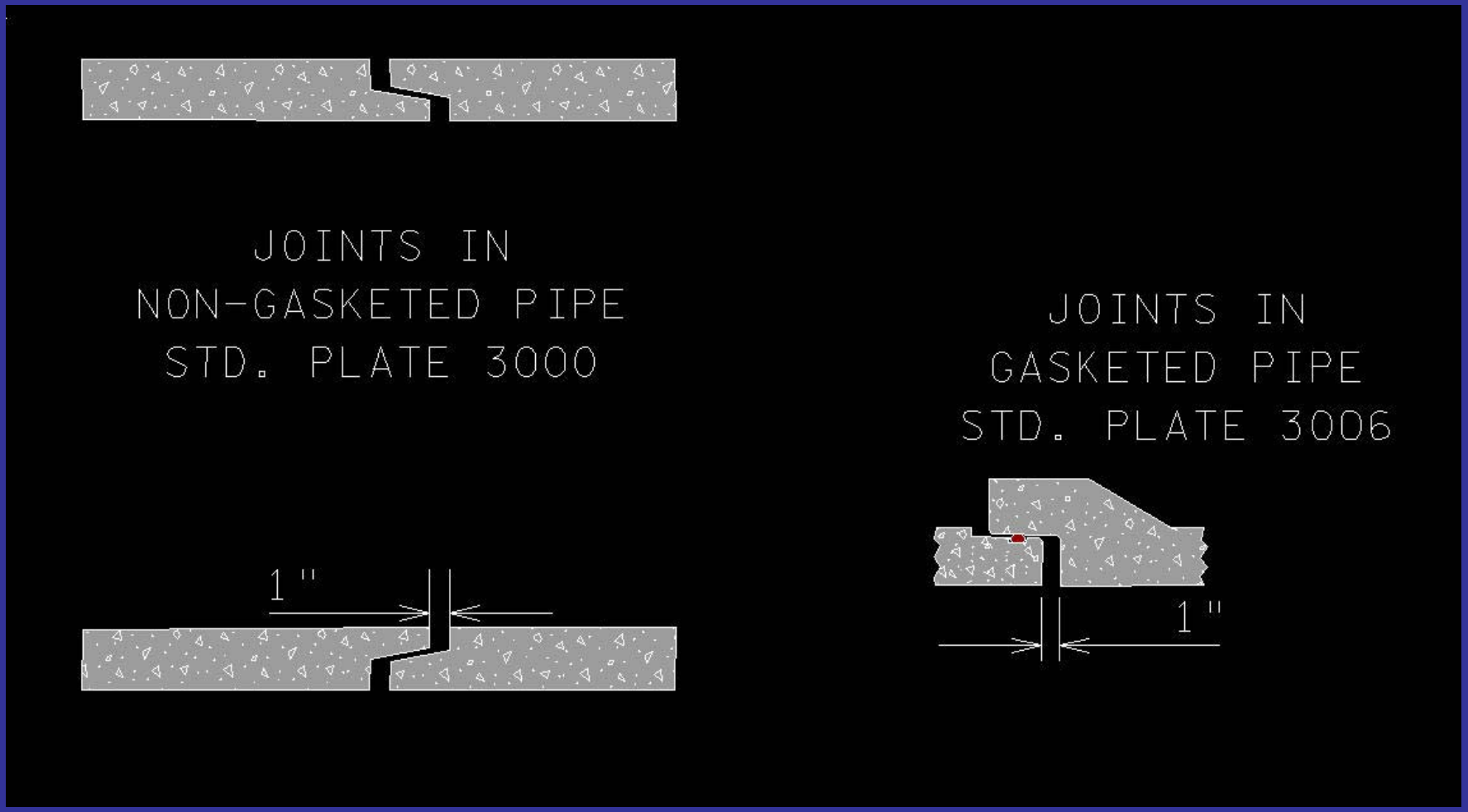
Concrete Joints
Separation Potential



Gasketed Joints

Non-Gasketed Joint

Joint Separation in Concrete



Estimate gap between pipe sections

Misalignment in Steel

- Pipe sections are offset, causing a non-linear or zigzag appearance

Misalignment in Concrete Pipe

- Pipe sections are offset, causing a non-linear or zigzag appearance

Deformation

- Feature’s shape is distorted, flattened or squashed

Infiltration

- Evidence of soil or water seeping into pipe

Piping

- Water runs along the outside of the pipe

Deteriorated Ties

- Pipe tie bolts are corroded, may not hold pipe joints together

Burnt Plastic (HDPE) PIPE

Grass fire caused pipe destruction

Sediment % Full

- Estimate depth of sediment compared to height of apron or pipe

60%?

HYDINFRA Ratings Guide

Roadway Indicators

Factors: Integrity of road fill material related to drainage features

Good Condition or Fair Condition

- No road settlement
- No pavement patching
- Road surface not affected

Poor Condition

- Marginal road surface settlement
- Pavement patching
- Pavement cracking above pipe
- Holes in inslope
- Voids around pipe (piping)

Very Poor Condition

- Voids around pipe (piping)
- Settlement of road surface
- Holes in road surface caused by pipe condition
- Evidence of repeated pavement patching

Roadway Indicators

Notes:

The general conditions of the roadway and adjacent area may be used as clues to help determine the condition rating for each hydraulic feature that is inspected. These general conditions may be indicators of concealed structural problems.

Inslope Cavitation

- A cavity or hole in the inslope of the roadway above a pipe or apron. Usually found where a joint separation has occurred

Road Distress

- Road bump, dip, pavement patch or cracks.

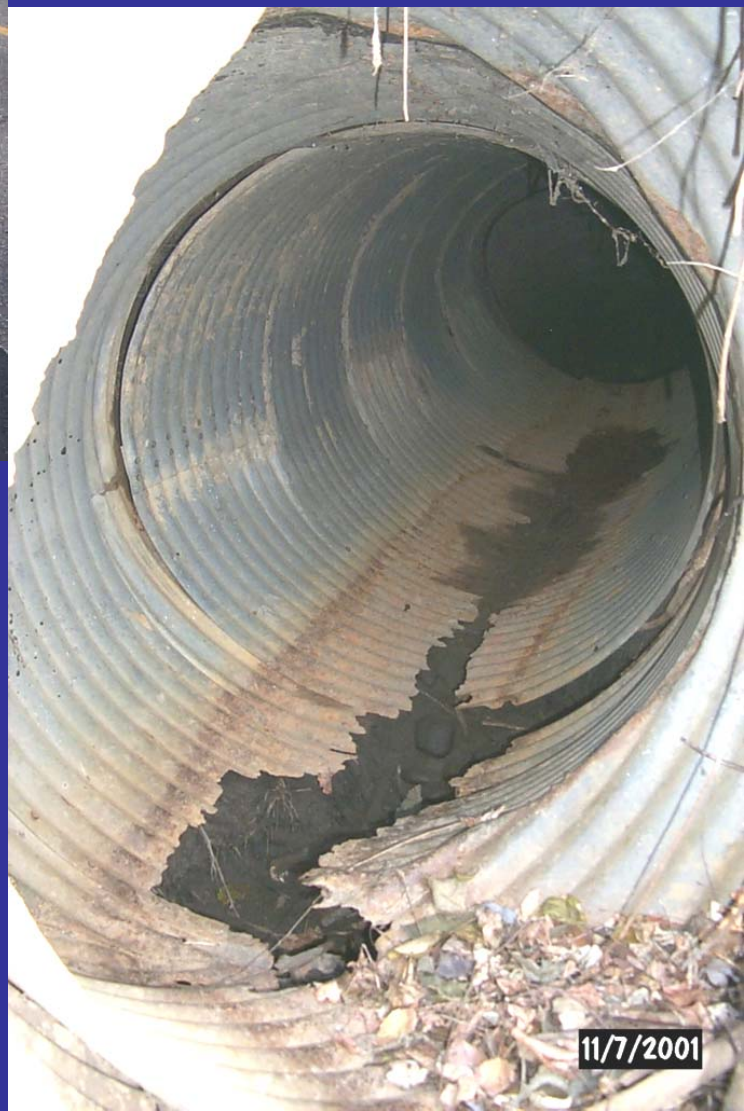
Indicates possible loss of roadbed material through poor condition pipe or structure

Road Void

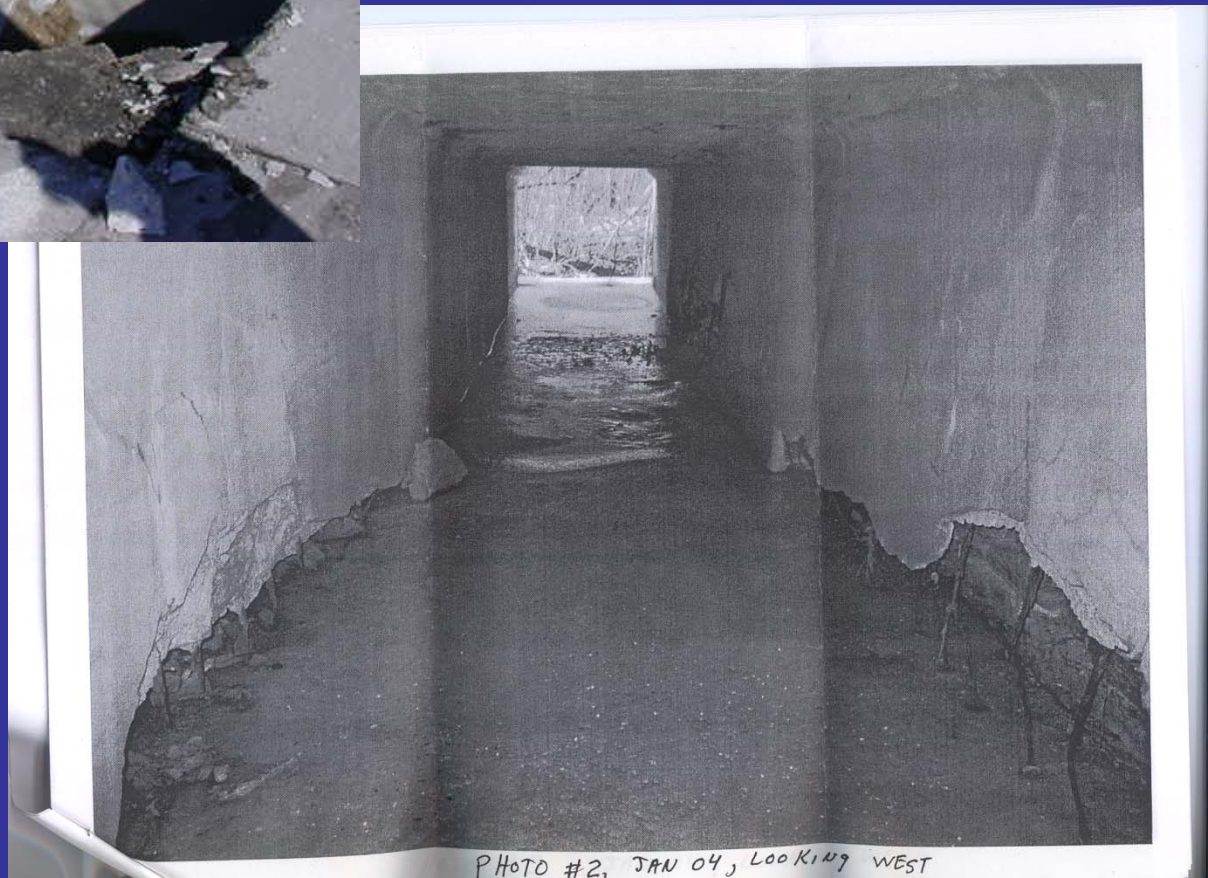
- Evidence of a loss of soil from the road above or near the pipe or structure
- Rate the pipe Condition 4

Road surface may indicate condition of pipe

MN 95 near MP 89, near Marine on the St. Croix

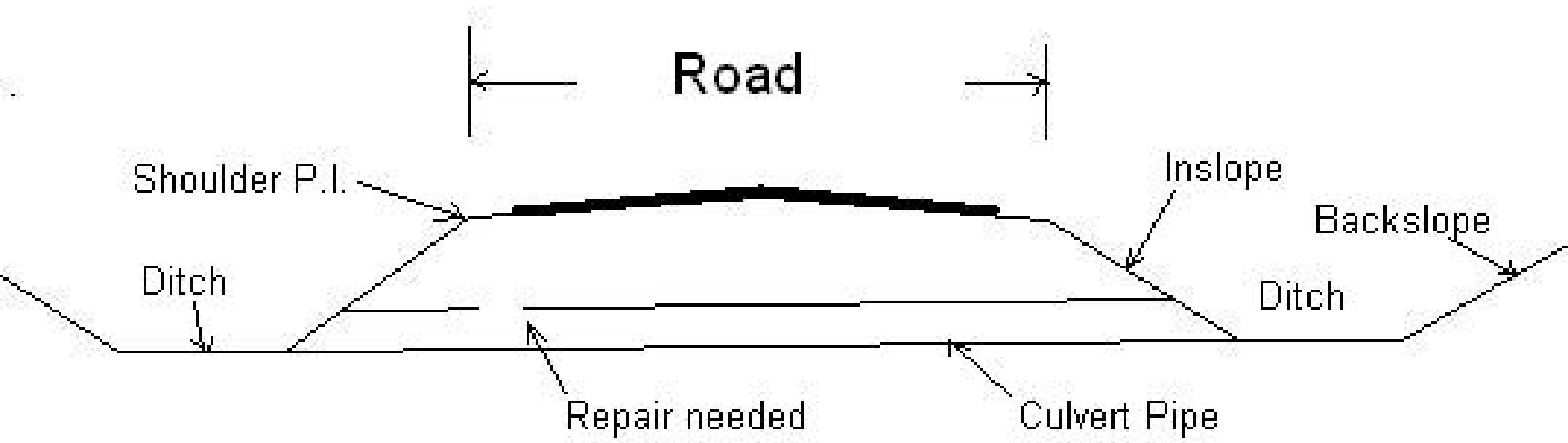


Road Surface may indicate pipe condition



Repair under Road = Y

- The needed repair is under the roadway

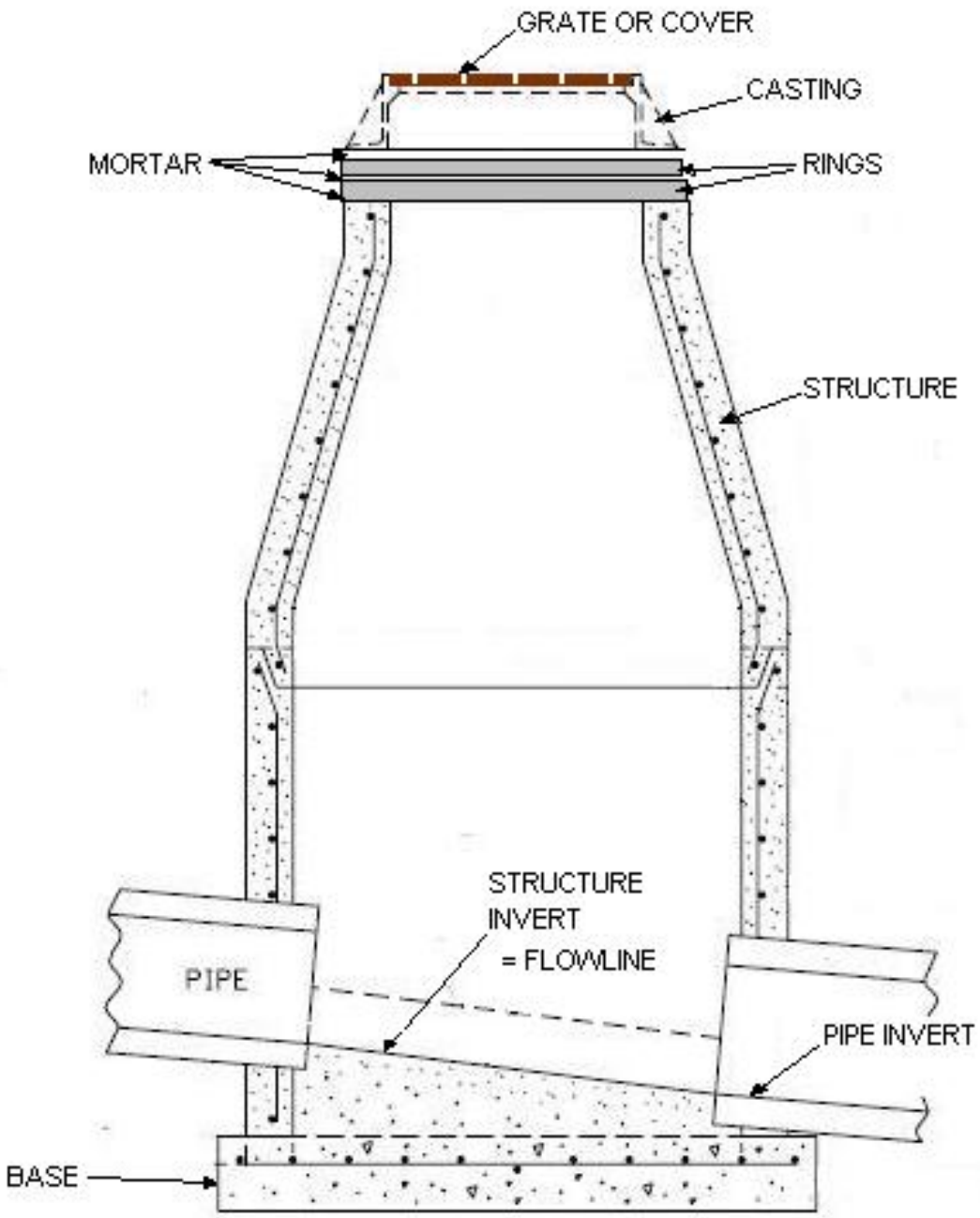


Repair under Road

Erosion

- Also known as scour or channel degradation, is evidenced by a gully, loss of vegetation or slumping of side slopes.

Parts of a Structure



Condition Ratings Examples

Ratings Guide

Concrete Pipe and Special Structure

HydInfra Ratings Guide

Concrete Pipe & Special Structure

Factors: Structural integrity, Integrity of surrounding material

1 Excellent Condition
- Minor chipping at joints/openings
- Hairline cracks
- Insignificant spalling or scaling

2 Fair Condition
- Joints broken or pulled apart up to 1" (anywhere along joint)
- Aggregate exposed
- Cracks evident with widths up to 1/8 inch
- Spalling or scaling to 1/4 inch depth

3 Poor Condition
- Joints broken or pulled apart 1"-3" (anywhere along the joint)
- Evidence of soil infiltration in pipe
- Cracking evident with widths 1/8 - 1/4 inch
- Spalling or scaling > 1/4 inch depth
- Reinforcement beginning to show
- Ends misaligned or shifted
- Pipe condition is causing soil loss in road shoulder or may be causing soil loss beneath road surface (infiltration)
- Apron or pipe is undermined (erosion)

4 Very Poor Condition
- Joints pulled apart or broken (more than 3" at any point along joint)
- Cracking evident with widths > 1/4 inch
- Reinforcement fully exposed in places
- Eroded holes through concrete or bottom gone
- Deformation
- Cracks showing movement – pipe pieces have shifted
- Pipe condition is causing soil loss beneath road surface

Notes:

Special Structures include Aprons, Slotted Drain, Headwalls, Wingwalls, open Flumes, Weirs, Expander/Reducers, Floodgates, Energy Dissipaters and other items that are <u>not</u> Pipes, Structures, SPCDs (Structural Pollution Control Devices), Ponds or Ditches.

Attributes such as crack width and spalling depth won't be measured in most cases – inspectors must estimate sizes based on what they see.

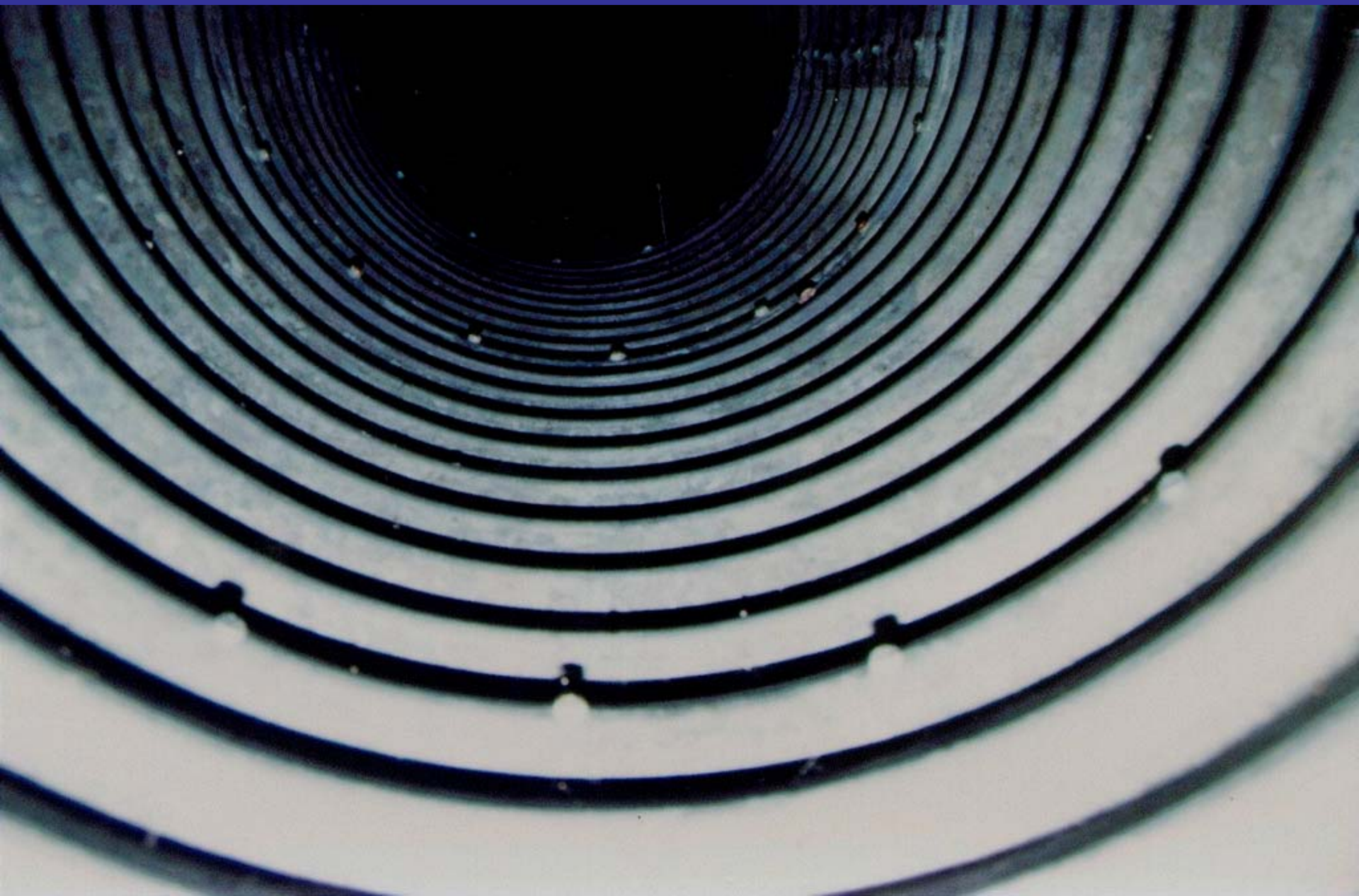
Condition 1

1 Excellent Condition

- □□ Minor chipping at joints/openings
- □□ Hairline cracks
- □□ Insignificant spalling or scaling

Note also the protruding pipe ties

Condition 1 Steel Plate



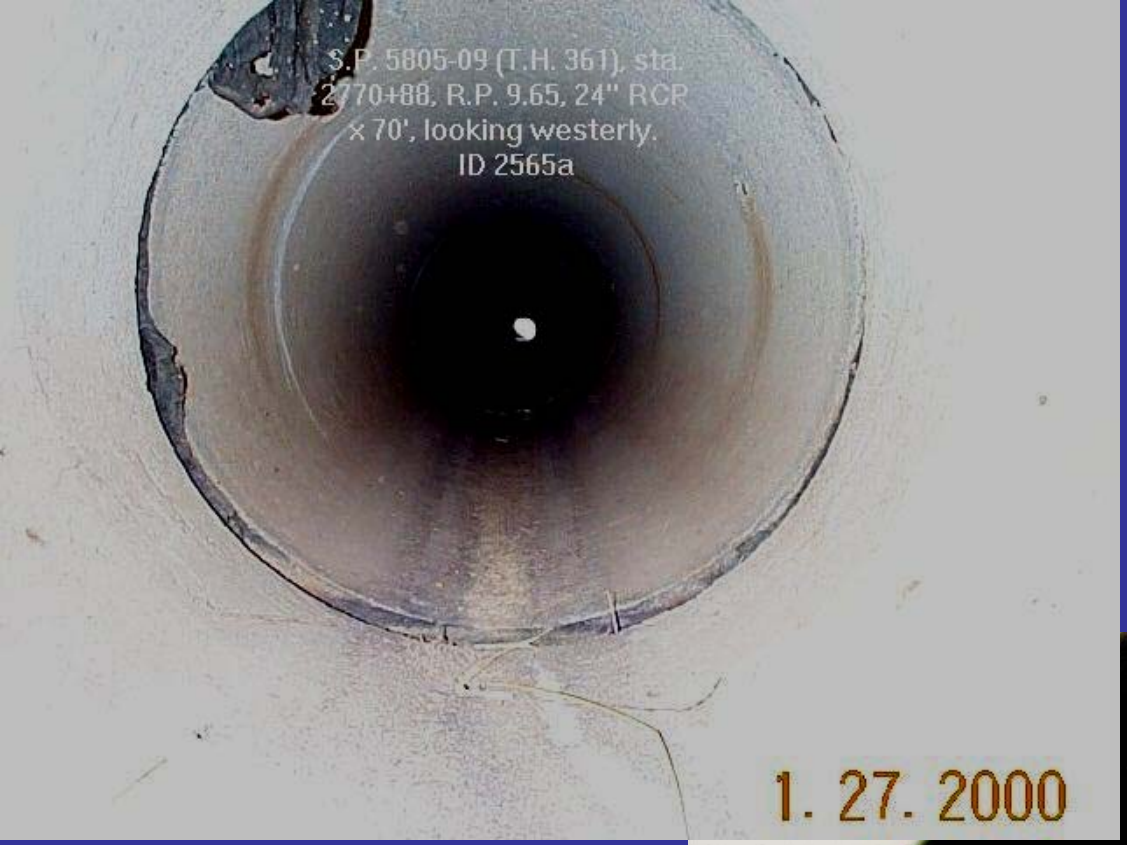
2 Fair Condition

- Joints broken or pulled apart up to 1" (anywhere along joint)
- Aggregate exposed
- Cracks evident with widths up to 1/8 inch
- Spalling or scaling to 1/4 inch depth

Condition 2: No repair is required.

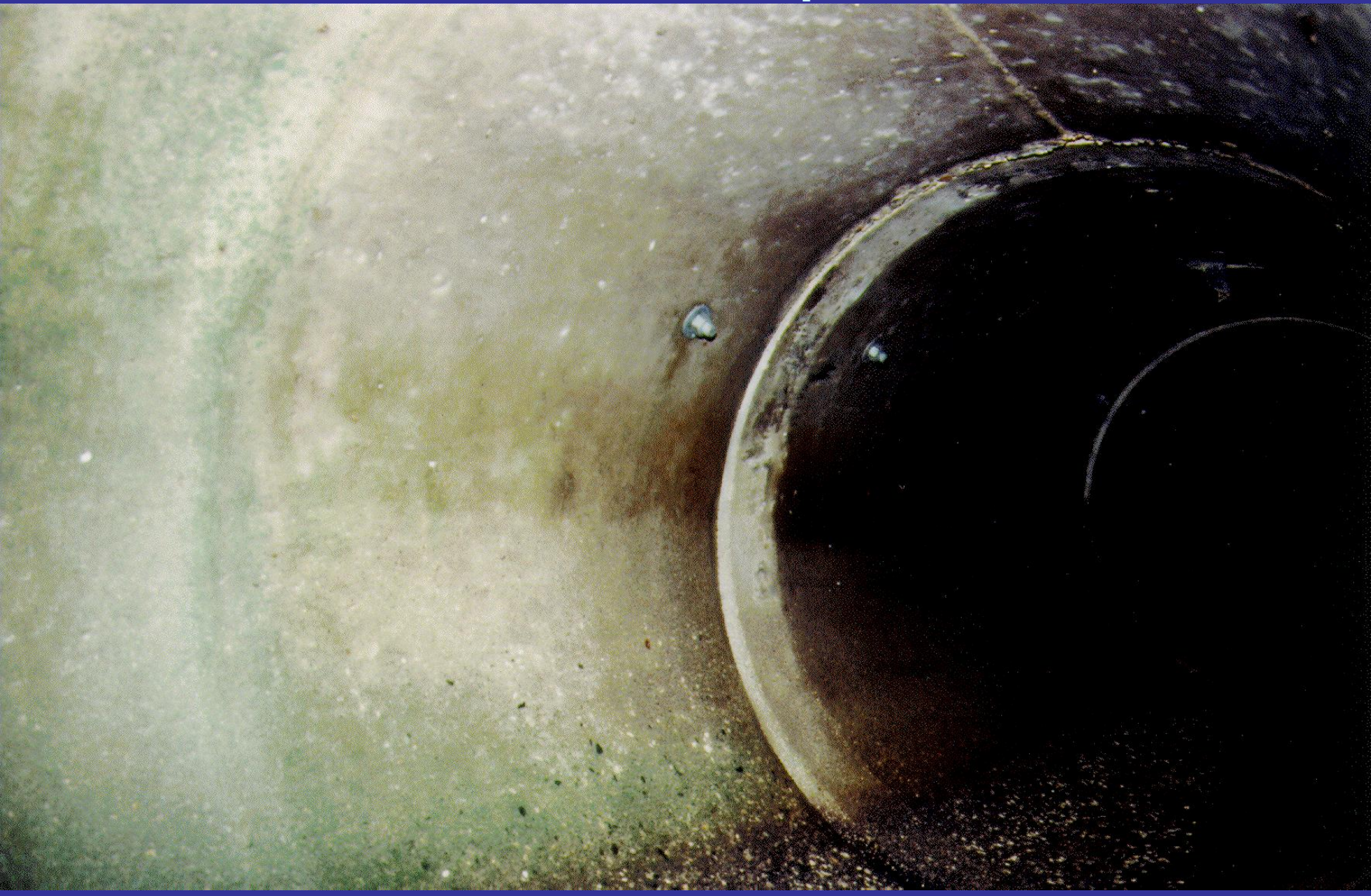
2 - Concrete Box with Round Extension

Concrete Apron - 2 – Repair not required



Condition 2 Concrete

Concrete Pipe - 2



Condition 2

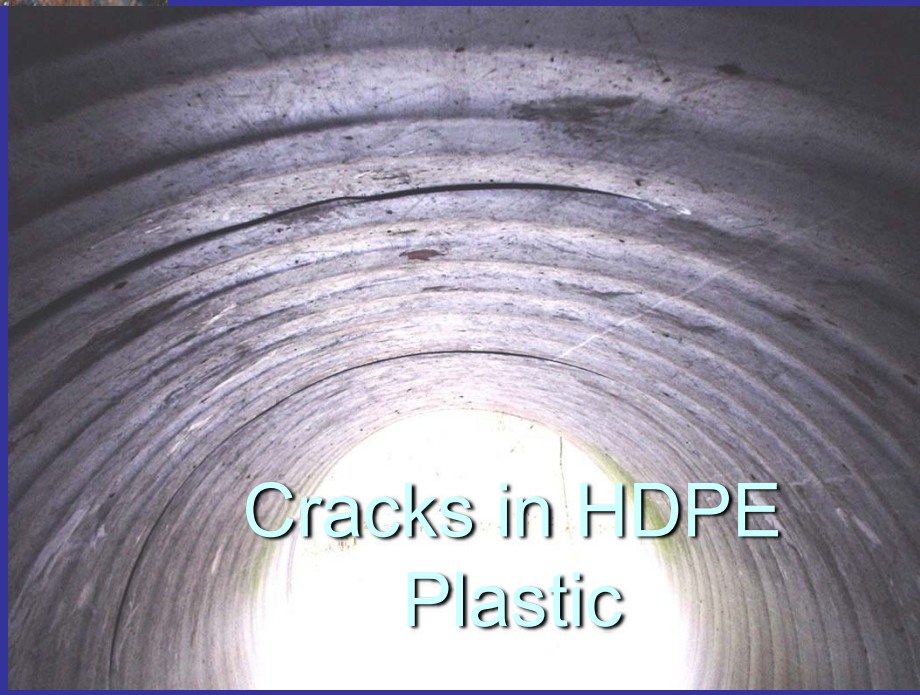
Condition 2 CMP

Condition 2 or 3 - Check for Flaking

Concrete Structure - 3

Concrete Pipe - 3

Condition 3



Concrete Pipe – 3 or 4?

Concrete Rating
Condition 4

4 Very Poor Condition

- Joints pulled apart or broken (more than 3" at any point along joint)
- Cracking evident with widths > 1/4 inch
- Reinforcement fully exposed in places
- Eroded holes through concrete or bottom gone
- Deformation
- Cracks showing movement – pipe pieces have shifted
- Pipe condition is causing soil loss beneath road surface

Concrete Pipe - 4

Concrete Condition 4

Concrete plugged. Crushed? - 4

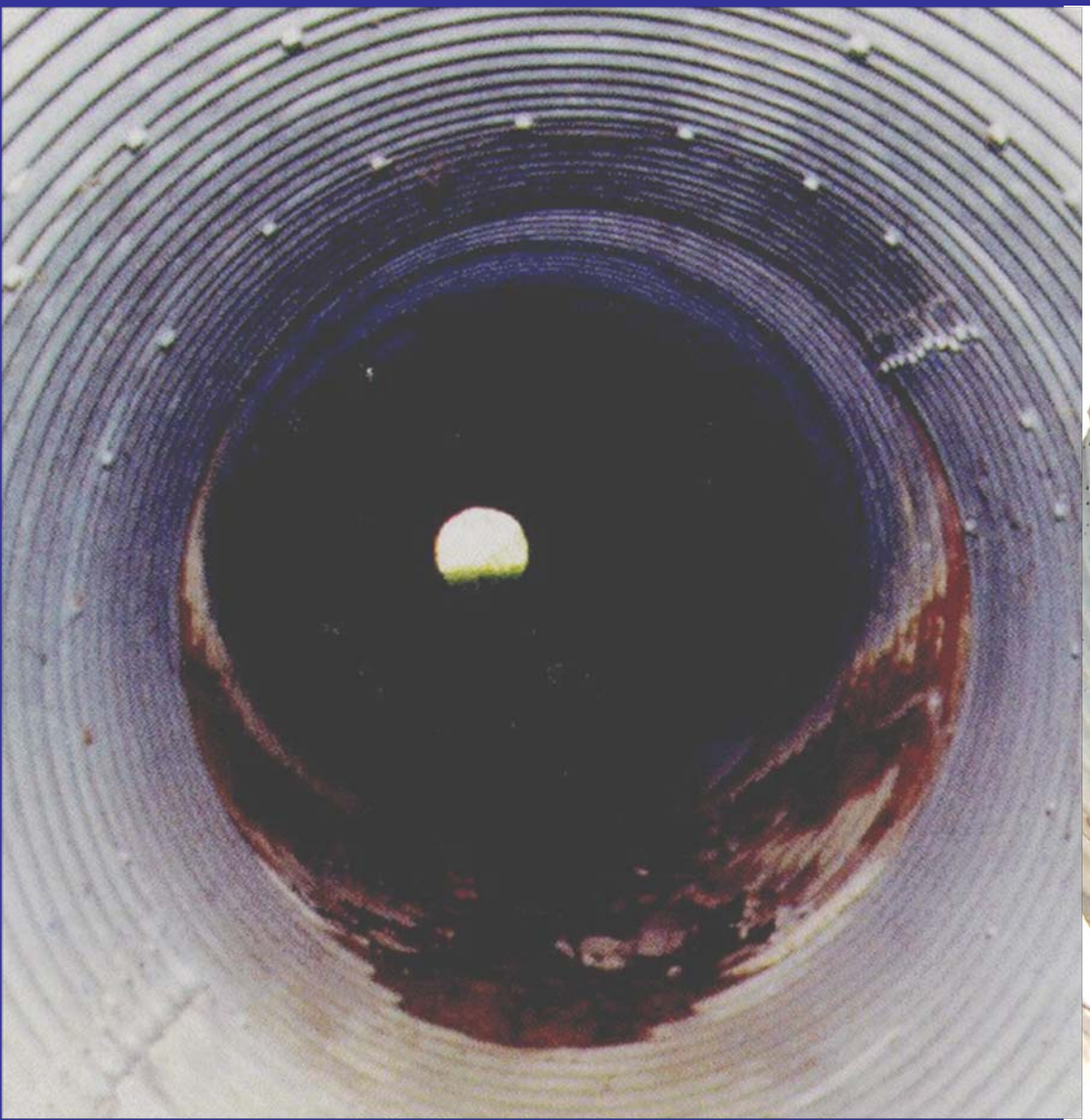
Burnt Plastic (HDPE) PIPE

Grass fire caused pipe destruction

Concrete Pipe Deformation - 4

Concrete Pipe I-94 at Pascal 4

Steel Condition 4 Pipe Examples



End