

# Cost-Effective Stormwater Management for City Streets

Kentucky Stormwater Association

June 27, 2019



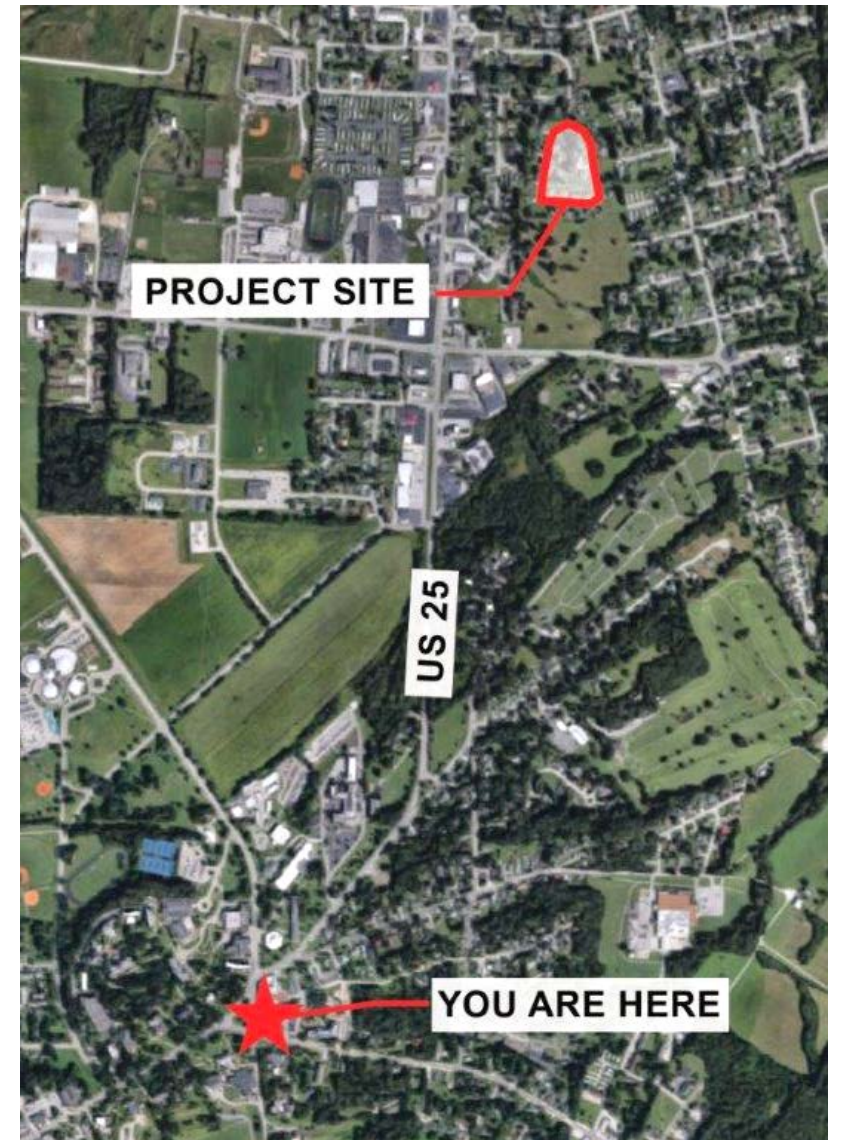
# Agenda

- Introductions
- Project Background
- Scope Development
- Design Issues
- Construction
- Lessons Learned & Unlearned



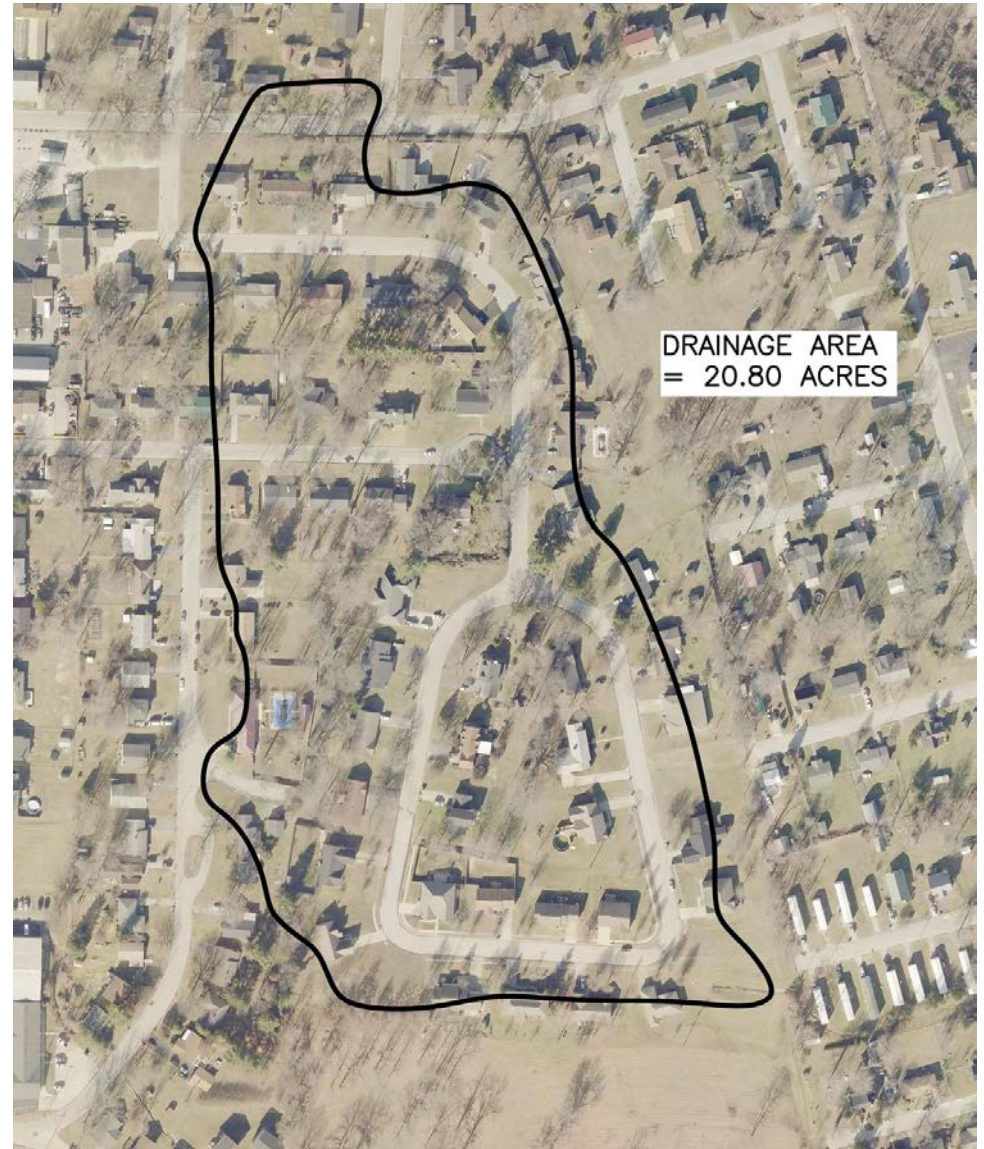
# Background

- South Cumberland Neighborhood (2 sections 1974 & 1994)
- Severe pavement deterioration
- Frequent pavement overlays
- Public Works maintenance budget



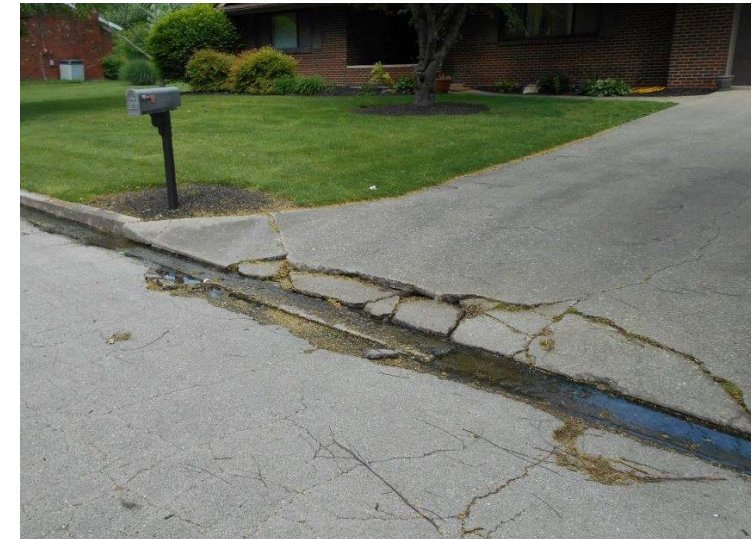
# Problem Definition

- Berea soils – decomposed New Albany Shale (clay-like)
- Watershed: 21 acres of overland ~ ½ mile travel
- Flat surface slopes
- Assumption: Poor subgrade drainage leads to pavement deterioration
- No budget for storm sewers



# Preconstruction Conditions

- Pavement deterioration
- Older curb & gutter in poor condition
- Many driveway aprons in poor condition



# Initial Project Scope

- Mill & overlay pavement
- Curb & gutter replacement
- Drive apron replacement

*Did not address surface or subgrade drainage*



# Alternatives Considered

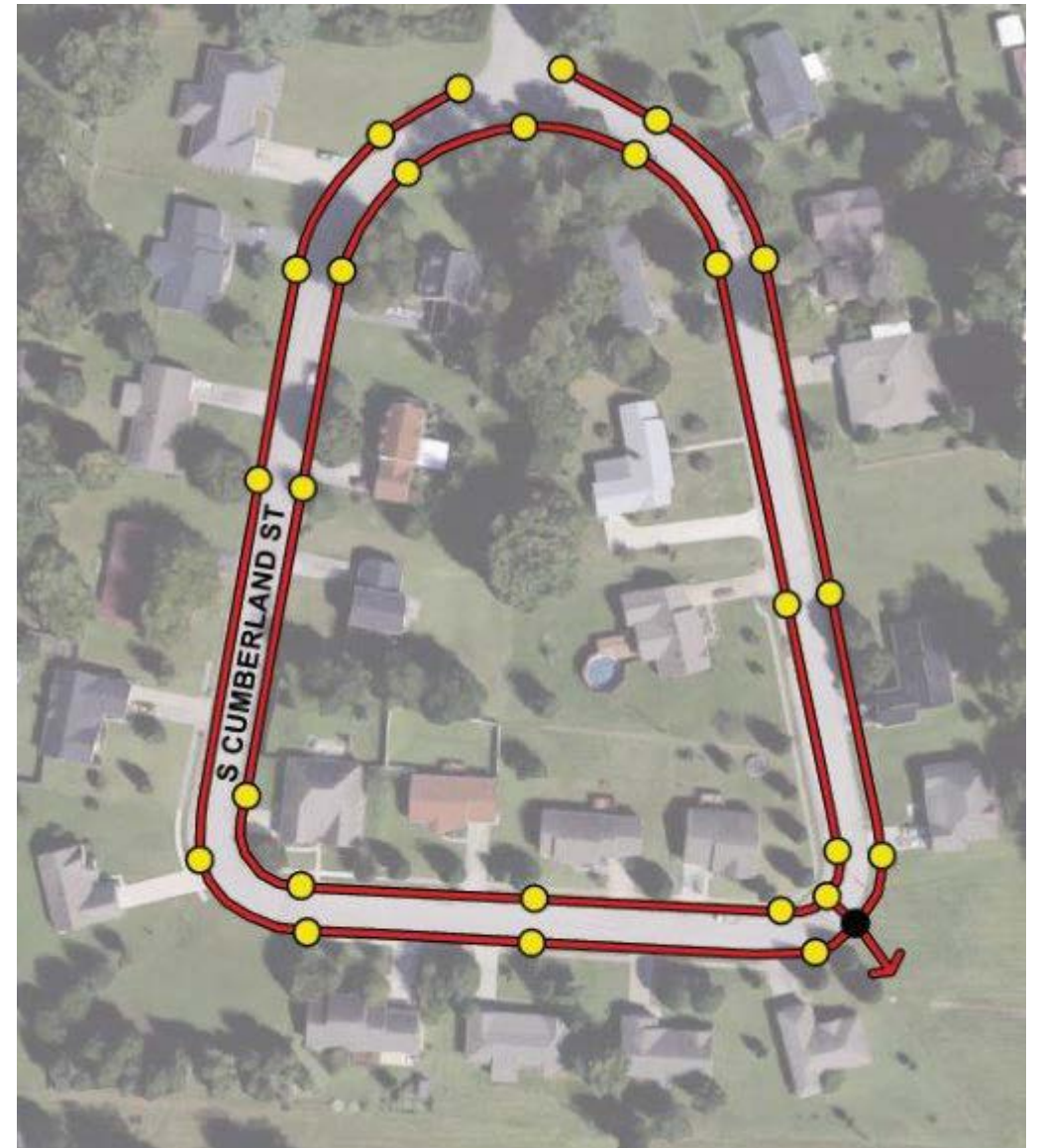
- Full-depth pavement replacement
- Pavement rehab plus storm sewer system
- Pavement rehab plus underdrain system
- **SELECTED:** Pavement rehab plus underdrain system and surface inlets



Downstream detention basin: future retrofit to improve WQ

# Design Considerations

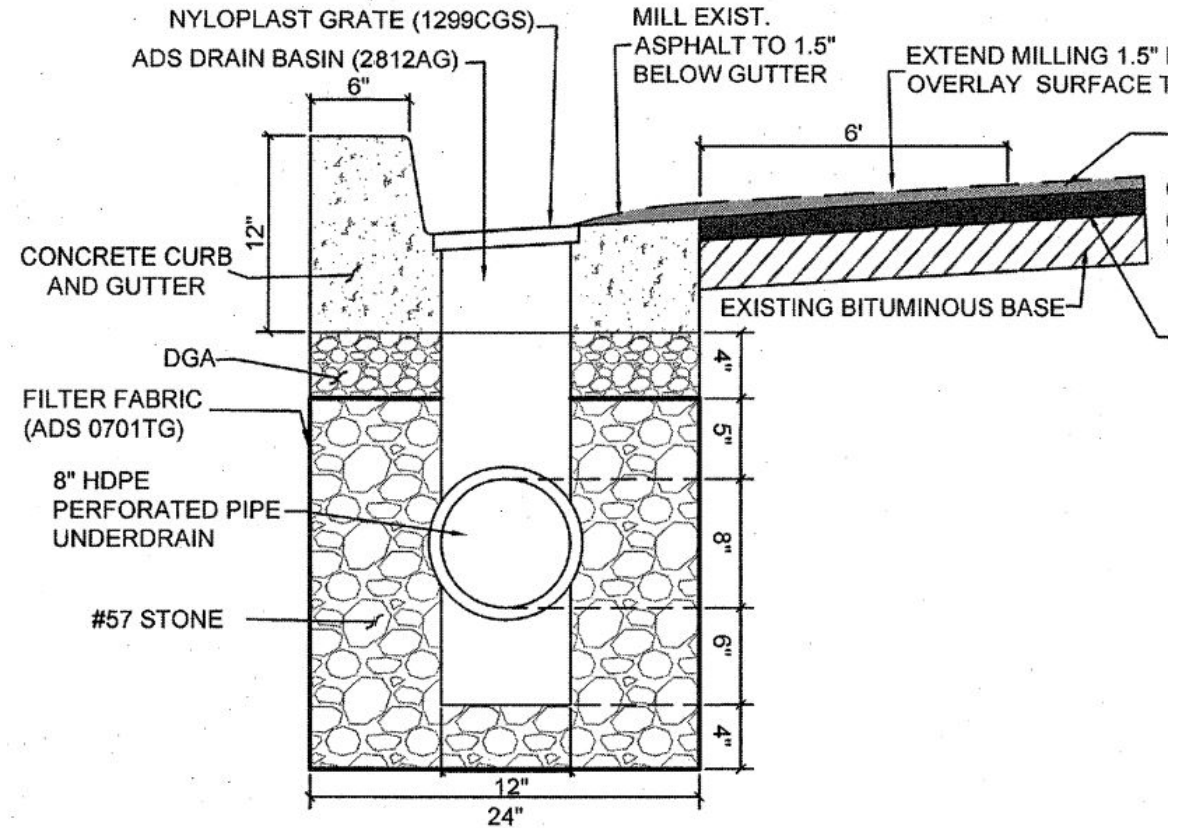
- Perforated pipe UD system to extend pavement life
- Frequent surface inlets for maintenance access
- No design storm – surface flow interception is “gravy”
- 3,560' - 8" perforated pipe, 26 inlets
- Cost-effective materials





# Design Details – North Section

- UD under gutter
- Replace C&G, some driveway aprons
- Mill & overlay

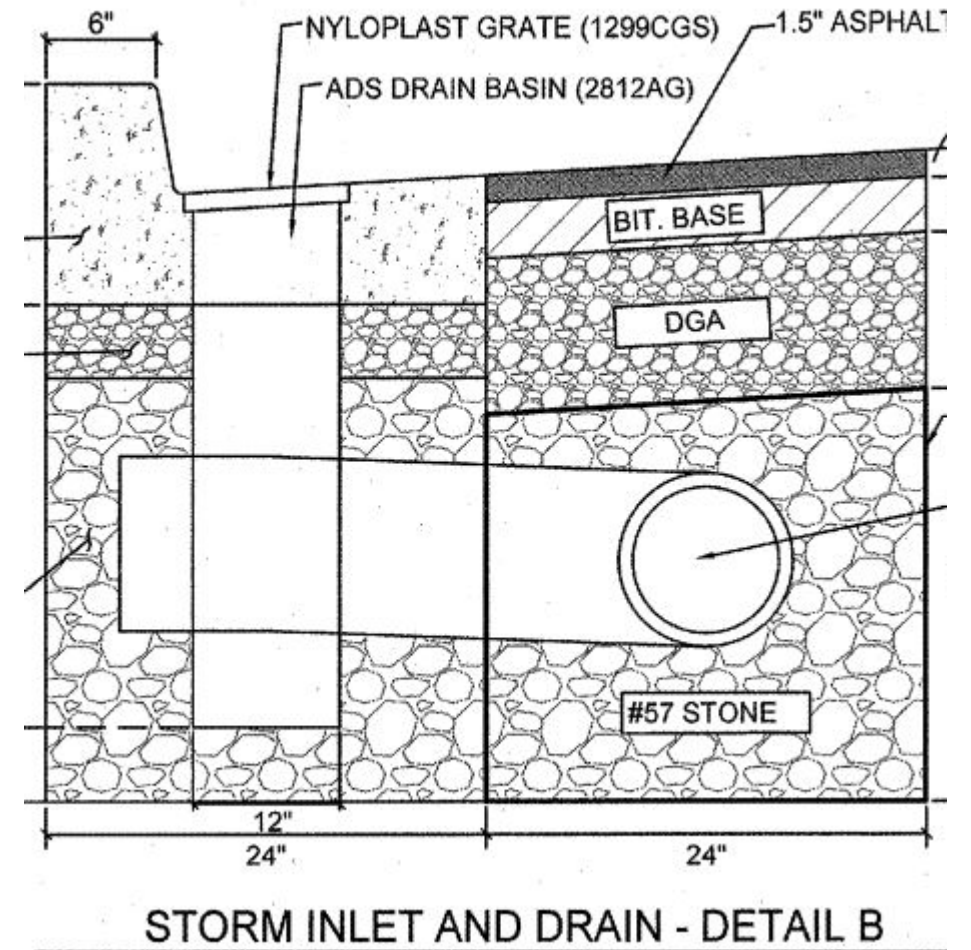
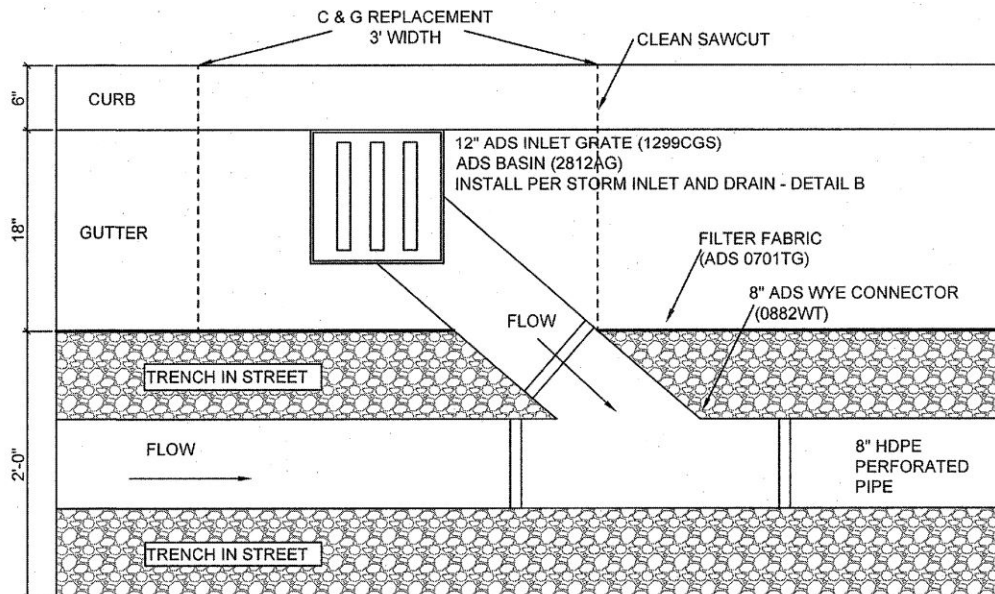


STORM INLET AND DRAIN, PAVING AND MILLING - DETAIL A

N.T.S.

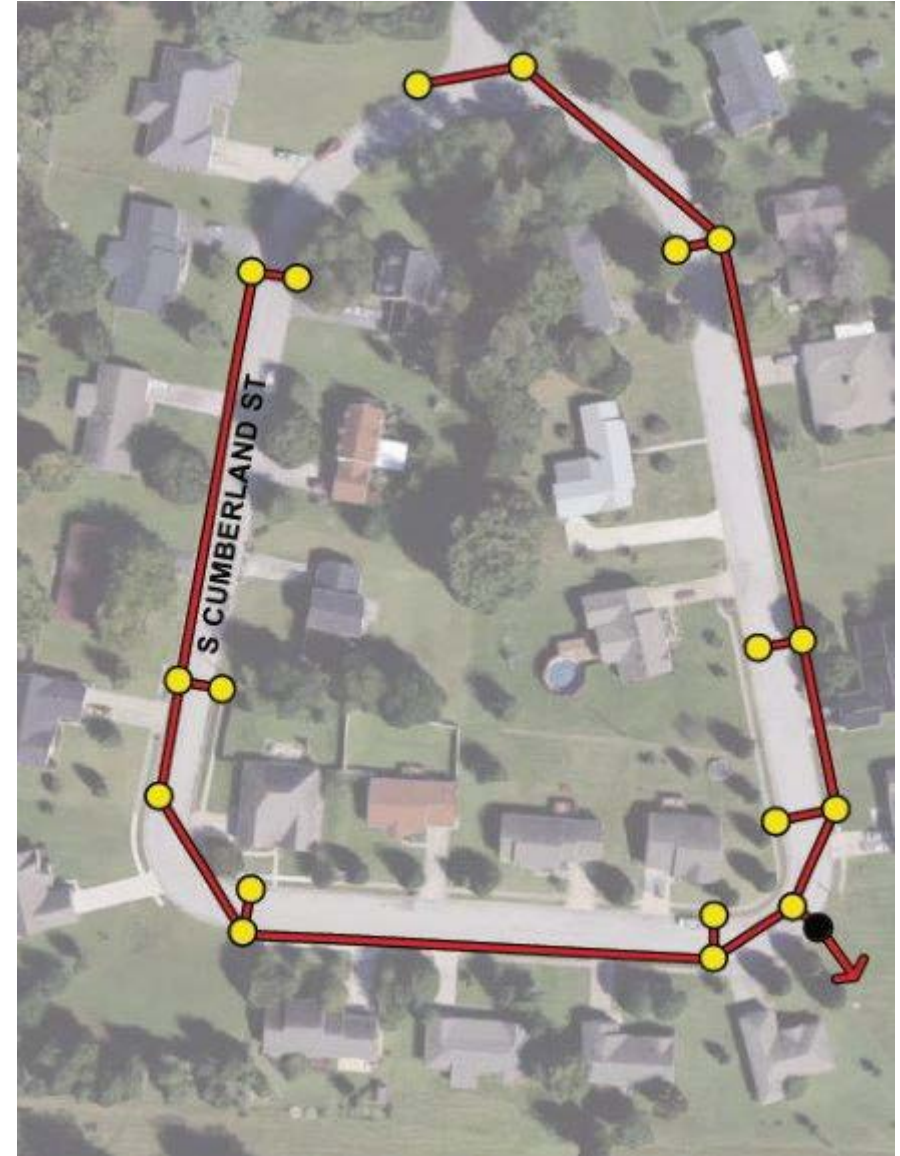
# Design Details – South Section

- UD in street
- Connect to existing CBI
- Replace C&G at inlets
- Mill & overlay



# Cost Savings

- Conventional storm sewer (shown at right):
  - 10-yr design storm
  - 1,915 lf 15" – 30" pipe
  - 18 CBIs, 1 MH
- Increased cost of nearly \$100,000, or 42% of total project



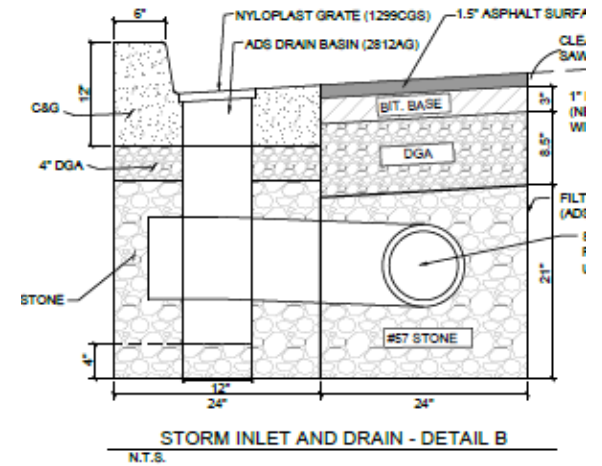
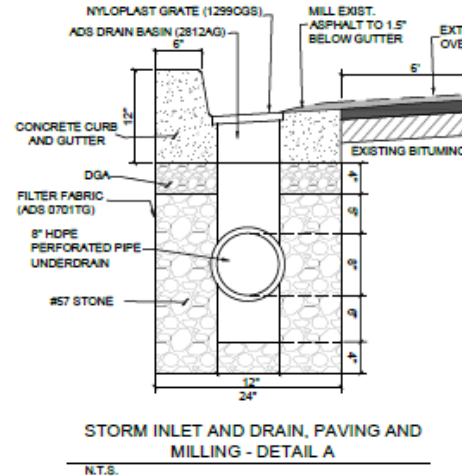
# Materials

- Perforated HDPE Corrugated Pipe
- Fittings – Wyes and Cross
- Nyloplast Drain Basins
- Curb Inlets



# Perforated HDPE

- Dual wall for improved conveyance and strength
- Perforated for capture and conveyance
- Flexible enough to build radius into design
- Gasketed connections at structures for long service life



# Nyloplast Basins and Grates

- Lightweight and Easy to Install
- Flexible...many options
- Traffic Rated
- Watertight Connections



# Maintenance

- Grate Cleaning
- Removable Grates
- May be Able to CCTV
- Smooth Wall Pipe Flushes Easily



# Construction Photos



Detail "A" – replace curb & gutter



Detail "B" at downstream end





# Construction Photos



Detail "B" – salvage existing curb & gutter

# Construction Photos - Oops



# Post-Construction



# Current Conditions

- Construction completed mid-2017
- Residents pleased with surface drainage
- Minimal leaf-clearing by residents
- No maintenance by City so far
- Pavement durability – TBD?



Upstream inlet



Next inlet downstream

# Lessons Learned and Unlearned

- OK to vary from “standard” design practices
- Underdrain added value
- Many contractors need close oversight
- Stormwater management includes underground!



# Questions?

Direct all questions to:

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Grand Canyon, AZ

