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IAFSM Illinois Association for Floodplain and Stormwater Management

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BMPS TO CONTROL COMBINED SEWER OVERFLOWS (CSO) CITY OF PEORIA

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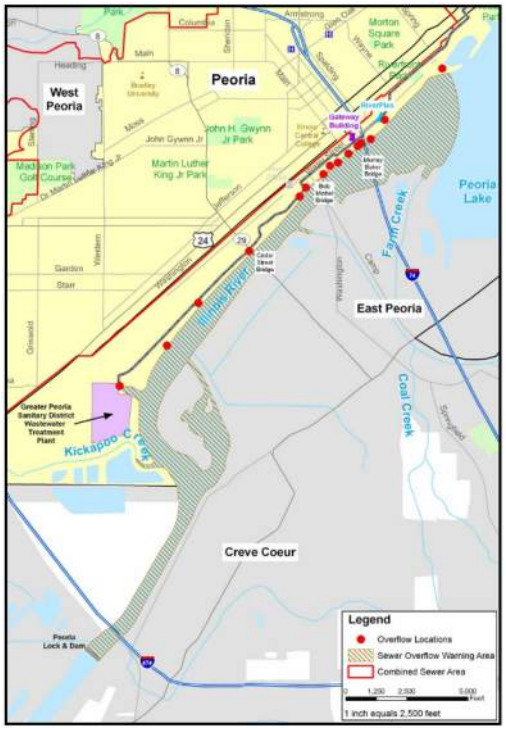

Peoria averages between 20-30 CSO events per year

PROJECT BACKGROUND

- Peoria built its first sewers in the late 1800s to carry runoff away from homes, businesses and streets. When indoor plumbing arrived, property owners hooked in their sewage lines.
- By 1931, these combined sewers were connected to the Greater Peoria Sanitary District (GPSD) treatment plant, but still overflow to Illinois River.
- Improvements completed in the 1990s, some of these overflow pipes are inactive. Only 5 remains.
- EPA has ordered the city to resolve violation and to develop a long-term plan to get CSOs as close to zero as possible in a 20-year program.
- would cost around $129 million

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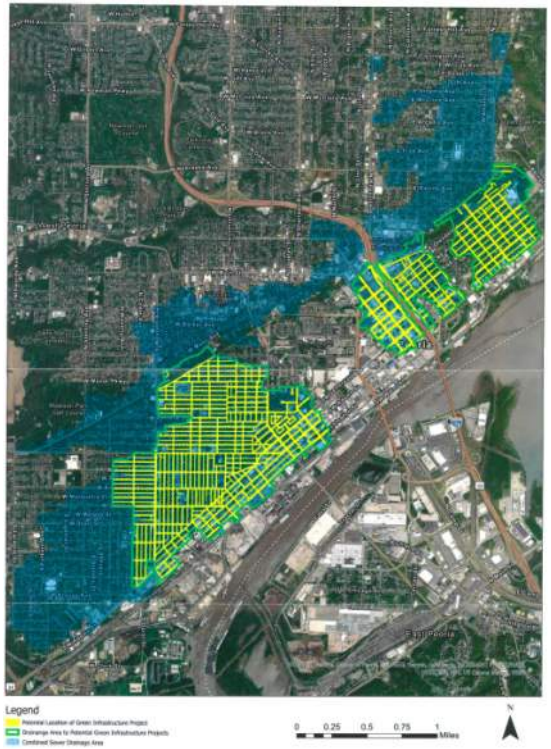
PROJECT BACKGROUND



Project Summary and
Preliminary Environmental Impacts Determination (PEID)

The following project summary and environmental assessment has been prepared by the IEPA to assist the loan applicant in complying with the public notice requirements. Information in this report was obtained, in part, from the following source: City of Peoria, Illinois Environmental Protection Agency State Revolving Fund Project Plan dated November 30, 2020, prepared by Symbiont.

Part I – Applicant and Project Information

Loan Applicant: City of Peoria

Project Number: IEPA Loan Project Numbers: L175910; L175911; L175912; L175913; L175914

Project Name: Long Term Control Plan (LTCP) **County:** Peoria

Current Population: 111,138 **Future Population (20 year):** 119,609

Project Description: This document will focus on proposed projects that will occur in the first five years of the LTCP. These projects consist of green infrastructure (GI) and in-system storage.

Approximately 7 acres of GI will be designed and constructed to capture approximately 78% of runoff below the bluff in the Sanger and South sewersheds and 100% of the runoff below the bluff in the remaining sewersheds, except Darst. It is estimated that 1.3 acres of GI, per year for the first three years, and approximately 1.55 acres per year for the fourth and fifth years will be built. The GI will include such things as permeable paver parking lanes, right of way shoulders, cross walks, and intersections. In some areas, bioswales may be incorporated. The GI will be located at and adjacent to existing inlets to the combined sewer. The stormwater will be captured by the GI, instead of flowing into the combined sewers through existing inlets

To address the stormwater that is not captured by the GI, ten locations within the system have been identified as being capable of providing cost effective in-system storage during storm events. Flow within the existing combined sewers will be restricted by modifying structures, within these existing combined sewers, that will cause the waste water level within the pipe to increase. The restriction will be designed to fill the existing combined sewer without overflowing it. Once the storm event has passed, the combined sewer will continue to transport the stored flows to the Waste Water Treatment Facility (WWTF) for treatment, reducing discharges of untreated flows directly to the environment, via the existing Combined Sewer Overflow (CSO) structures.

Project Location: The overall combined sewer area as well as the potential locations of green infrastructure projects and associated drainage areas are shown on the attached map.

Project Justification: In December 2008, the City of Peoria developed its CSO LTCP. The City of Peoria's objectives in completing the LTCP are to come into and remain in full compliance with the terms and conditions of its National Pollution Discharge Elimination System (NPDES) Permit and to meet the objectives of USEPA's April 19, 1994 Combined Sewer Overflow Policy, the Clean Water Act, and the CSO control requirements of the Illinois Administrative Code. Since 2014, the City of Peoria has been negotiating a Consent Decree with the USEPA, IEPA, and United States Department of Justice (DOJ). The information provided in this Project Plan is based on the

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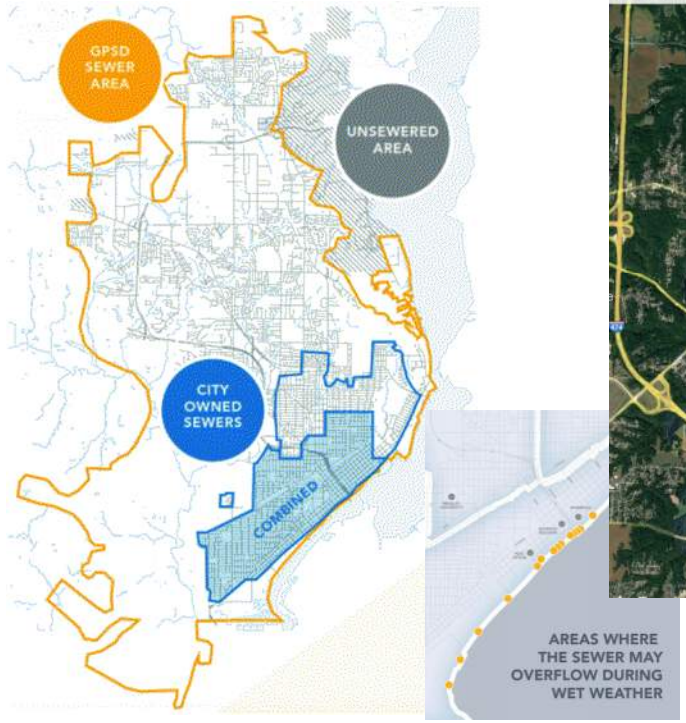
PROJECT AREA



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PROJECT AREA

- 18 STREETS
- 39 BLOCKS
- 28,630 LF
- 161 ACRES
- 182 STRUCTURES

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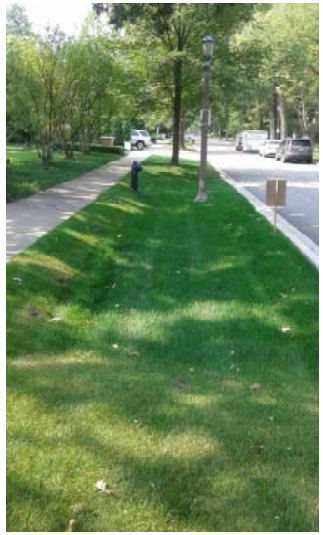
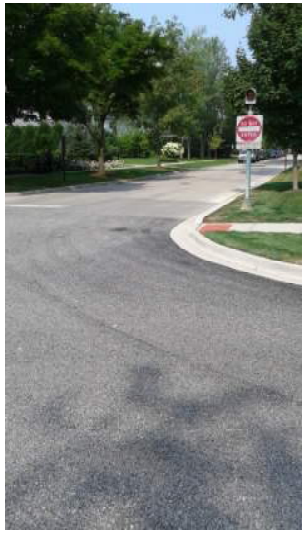
BMP SOLUTIONS

Roadside rain garden/Bumpout

Permeable Pavers



Porous Parkway/
Roadside Swale



Porous Asphalt

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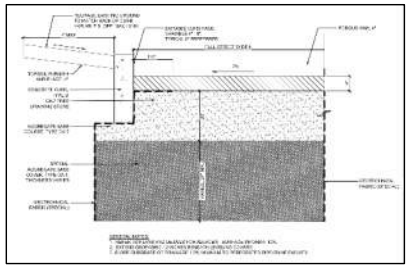
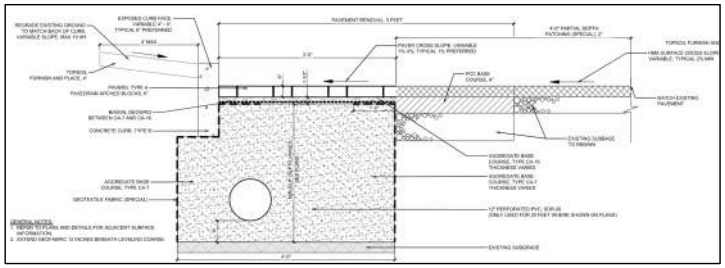
BMP MODELING

Map Reference GI ID	Street	Side of Street	Cross Street 1	Cross Street 2	GI Type	Stormwater Inlet / Routing Notes	Minimum GI Storage Area (ft2)
1	Millman	North	Western	Blaine	PaveDrain		710
2	Millman	South	Western	Blaine	PaveDrain		450
3	Millman	North	Blaine	Warren	PaveDrain		410
4	Millman	South	Blaine	Warren	PaveDrain		370
5	Millman	North	Warren	Shelley	PaveDrain		290
6	Millman	South	Warren	Shelley	PaveDrain		190
7	Millman	North	Shelley	Louisa	PaveDrain		640
8	Millman	South	Shelley	Louisa	PaveDrain		520
9	Millman	North	Louisa	Webster	PaveDrain		1130
10	Millman	South	Louisa	Webster	PaveDrain		680
11	Millman	North	Webster	Charlton	Bump-in		220
12	Millman	South	Webster	Charlton	Sheet flow	sheet flow to 137	0
13	Millman	North	Charlton	Linden	Bump-in		2260
14	Millman	South	Charlton	Linden	Storm Inlet	storm inlet to 13	0
15	Butler	North	Western	Blaine	Storm Inlet	storm inlet to 83	0
16	Butler	South	Western	Blaine	Storm Inlet	storm inlet to 84	0
17	Butler	North	Blaine	Warren	Storm Inlet	storm inlet to 87	0
18	Butler	South	Blaine	Warren	Bump-in & Storm Inlet	storm inlet to 87	480
19	Butler	North	Warren	Shelley	Bump-in & Storm Inlet	storm inlet to 91	240
20	Butler	South	Warren	Shelley	Bump-in		250
21	Butler	North	Shelley	Louisa	Storm Inlet	storm inlet to 92	0
22	Butler	South	Shelley	Louisa	Storm Inlet	storm inlet to 92	0
23	Butler	North	Louisa	Webster	Bump-in & Storm Inlet	storm inlet to 115	150
24	Butler	South	Louisa	Webster	Bump-in & Storm Inlet	storm inlet to 115	140
25	Butler	North	Webster	Charlton	Bump-in		280
26	Butler	South	Webster	Charlton Brotherso	Bump-in		230

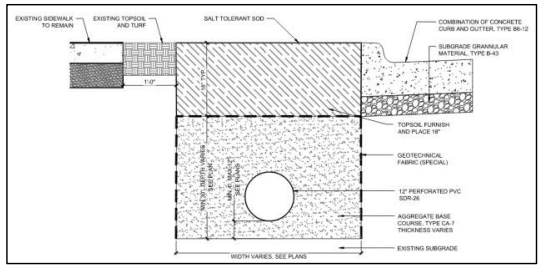
- Permeable pavement consists of PaveDrain arched blocks (approximately 6 inches high) and storage volume provided by 6 inches of CA-7 and 36 inches of CA-1 or CA-7 (porosity 0.40).
- Bump-in consists of 30" storage depth using CA-7 or CA-1 (porosity 0.4), overlaid by 18" of engineered soil media (porosity 0.25).
- Full width porous asphalt will be approximately 6 inches of pavement, overlaying 42 inches of CA-1 (porosity 0.40).



5 POROUS ASPHALT FULL SECTION



1 TYPICAL PERMEABLE PAVER FULL SECTION



4 BUMP-IN BIOINFILTRATION TRENCH

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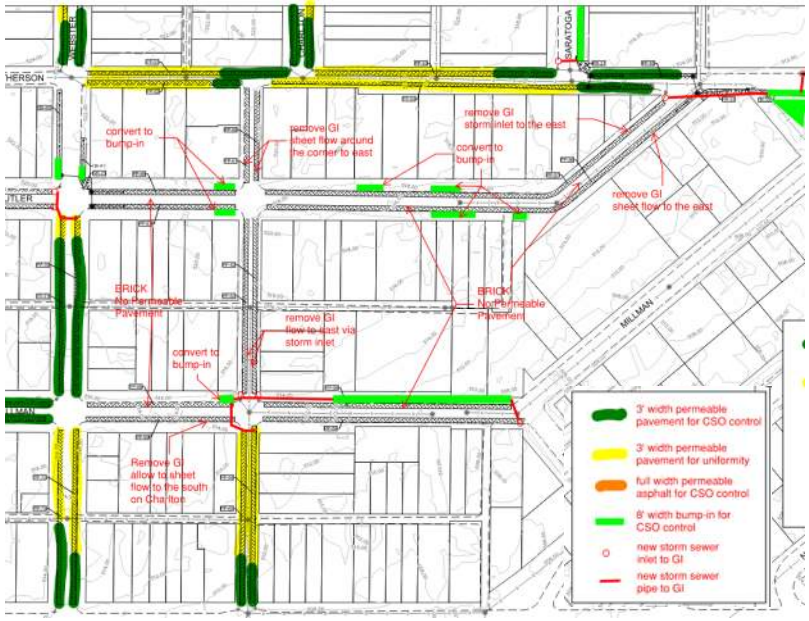
BMP PLACEMENT



- Topography of the roadway
- Upstream area
- Effective design – BMP is series
- Area needed and space available
- Downstream connection, Overflow direction
- Construction cost
- Utilities
- Constructability
- Aesthetics
- Village and public feedback

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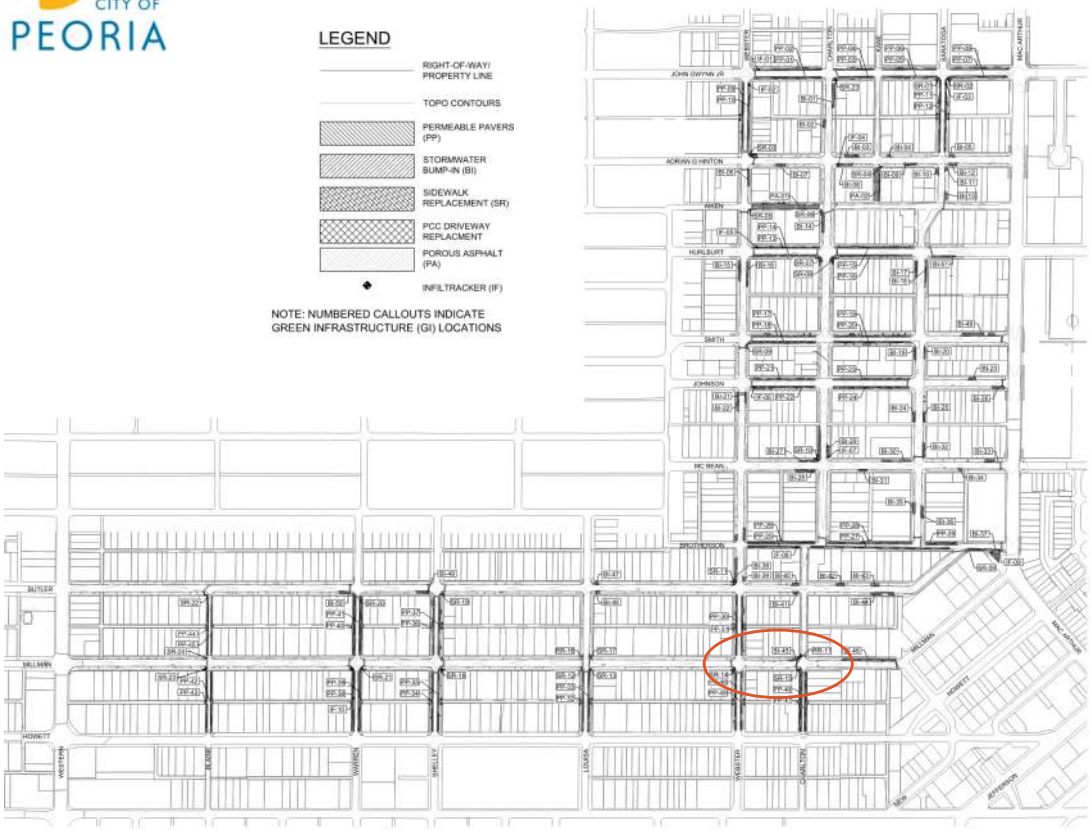
FINAL DESIGN



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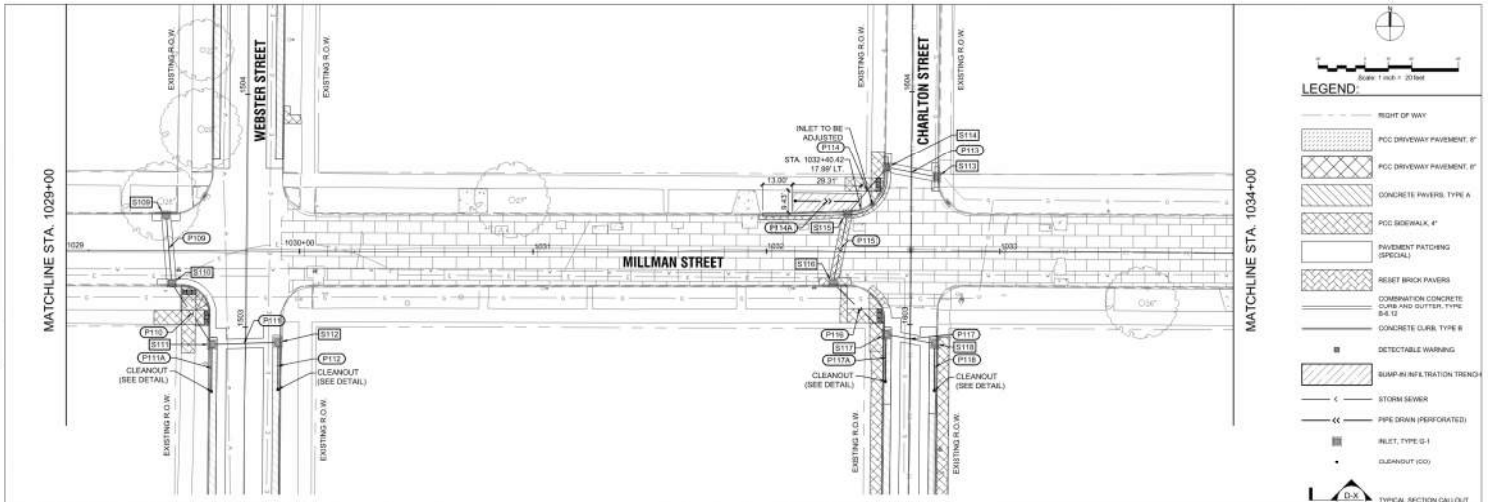
FINAL DESIGN



STR. NO.	STATION	OFFSET	STRUCTURE TYPE	RIM ELEVATION	INV. IN	U/S PIPE	INV. OUT	D/S PIPE
S109	1029+42.69	15.06LL	INLETS, TYPE G-1	514.56			510.89	P109
S110	1029+45.27	13.71RR	INLETS, TYPE G-1	514.50	510.76	P109	510.76	P110
S111	1502+92.54	14.37LL	INLETS, TYPE G-1	514.26	510.63 507.41	P110 P111A	507.41	P111
S112	1502+93.71	14.11RR	INLETS, TYPE G-1	514.25	507.41	P111	507.41	P112
S113	1603+63.28	10.84RR	INLETS, TYPE G-1	512.05			508.32	P113
S114	1603+67.13	10.44LL	INLETS, TYPE G-1	512.10	508.23	P113	508.23	P114
S115	1032+34.68	15.90LL	INLETS, TYPE G-1	511.55	508.13	P114	508.13	P115
S116	1032+28.66	13.47RR	INLETS, TYPE G-1	511.61	507.99	P115	507.99	P116
S117	1602+95.80	10.18LL	INLETS, TYPE G-1	511.39	507.85 507.07	P116 P117A	507.07	P117
S118	1602+92.05	10.67RR	INLETS, TYPE G-1	511.47	507.07	P117	507.07	P118

PIPE NO.	FROM STR.	U/S INVERT	TO STR.	D/S INVERT	CLASS/TYPE	DIA.	LENGTH	SLOPE	TBF. CY
P109	S109	510.89	S110	510.76	STORM SEWERS, TYPE 1, WM QUALITY PIPE	12	30'	0.4%	7
P110	S110	510.76	S111	510.63	STORM SEWERS, TYPE 1, WM QUALITY PIPE	12	32'	0.4%	7
P111	S111	507.41	S112	507.41	STORM SEWERS, TYPE 1, WM QUALITY PIPE	12	29'	0.0%	20
P111A	CO-96	507.41	S111	507.41	PIPE DRAINS (PERFORATED)	12	20'	0.0%	0
P112	S112	507.41	CO-97	507.41	PIPE DRAINS (PERFORATED)	12	20'	0.0%	0
P113	S113	508.32	S114	508.23	STORM SEWERS, TYPE 1, WM QUALITY PIPE	12	22'	0.4%	5
P114	S114	508.23	S115	508.13	STORM SEWERS, TYPE 1, WM QUALITY PIPE	12	26'	0.4%	6
P114A	CO-80	508.13	TEE	508.13	PIPE DRAINS (PERFORATED)	12	27'	0.0%	0
P115	S115	508.13	S116	507.99	STORM SEWERS, TYPE 1, WM QUALITY PIPE	12	30'	0.5%	6
P116	S116	507.99	S117	507.85	STORM SEWERS, TYPE 1, WM QUALITY PIPE	12	32'	0.4%	7
P117	S117	507.07	S118	507.07	STORM SEWERS, TYPE 1, WM QUALITY PIPE	12	21'	0.0%	7
P117A	CO-118	507.07	S117	507.07	PIPE DRAINS (PERFORATED)	12	20'	0.0%	0
P118	S118	507.07	CO-119	507.07	PIPE DRAINS (PERFORATED)	12	20'	0.0%	0

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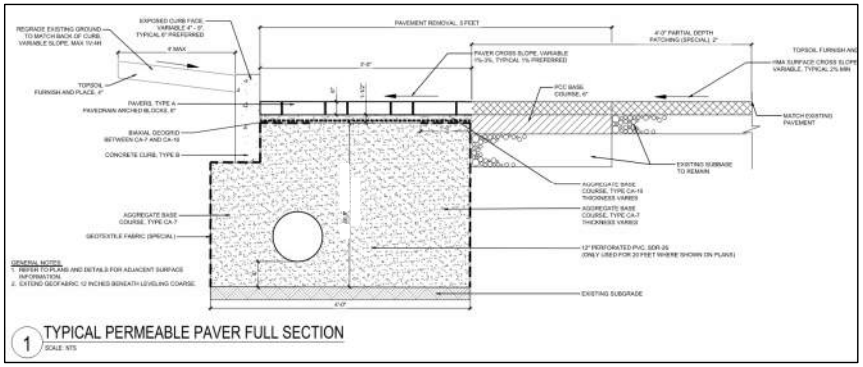
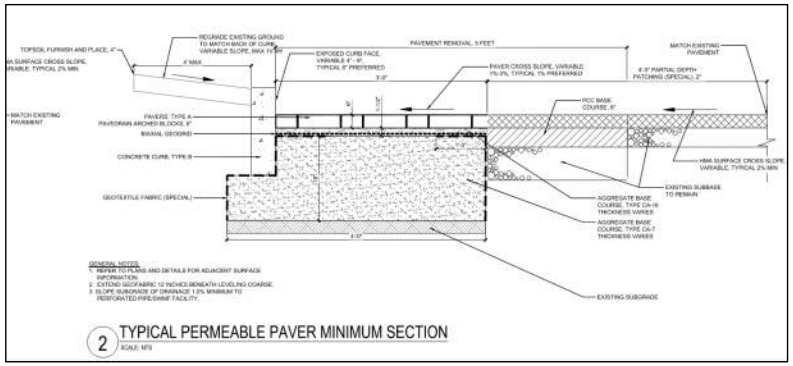
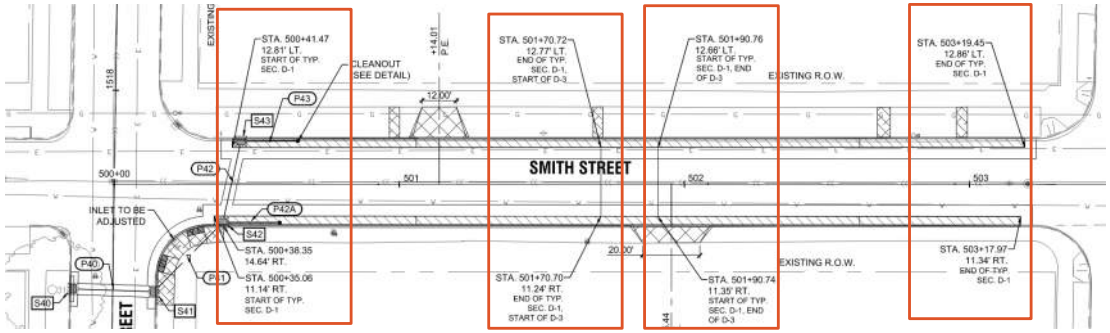
PERMEABLE PAVERS







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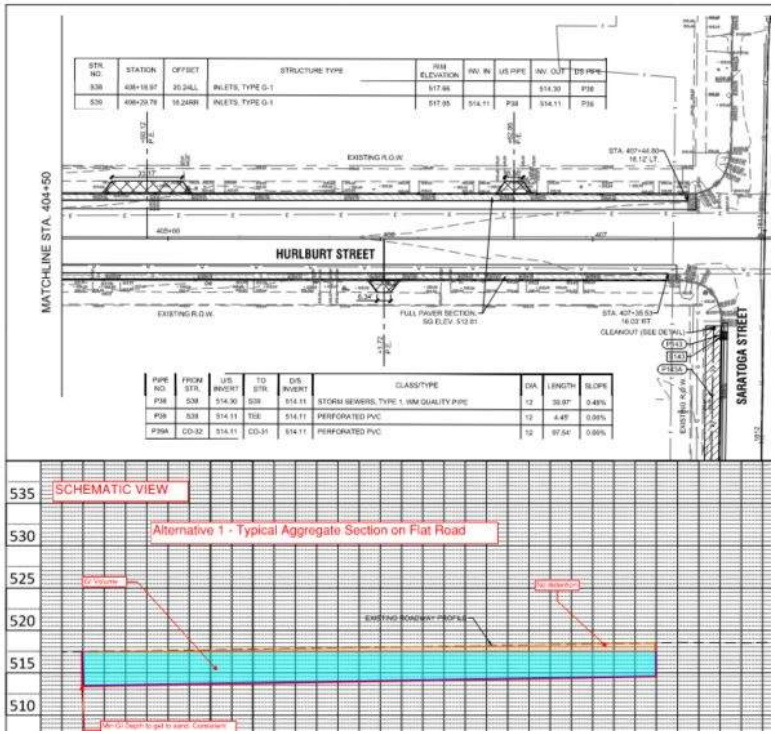
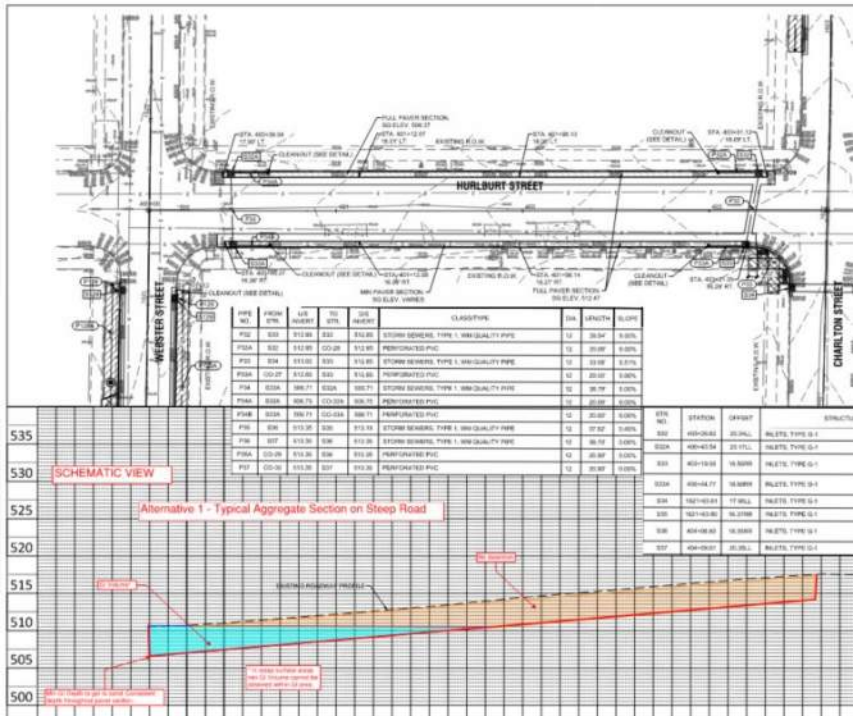
OPTIMIZING PERMEABLE PAVERS PROFILE





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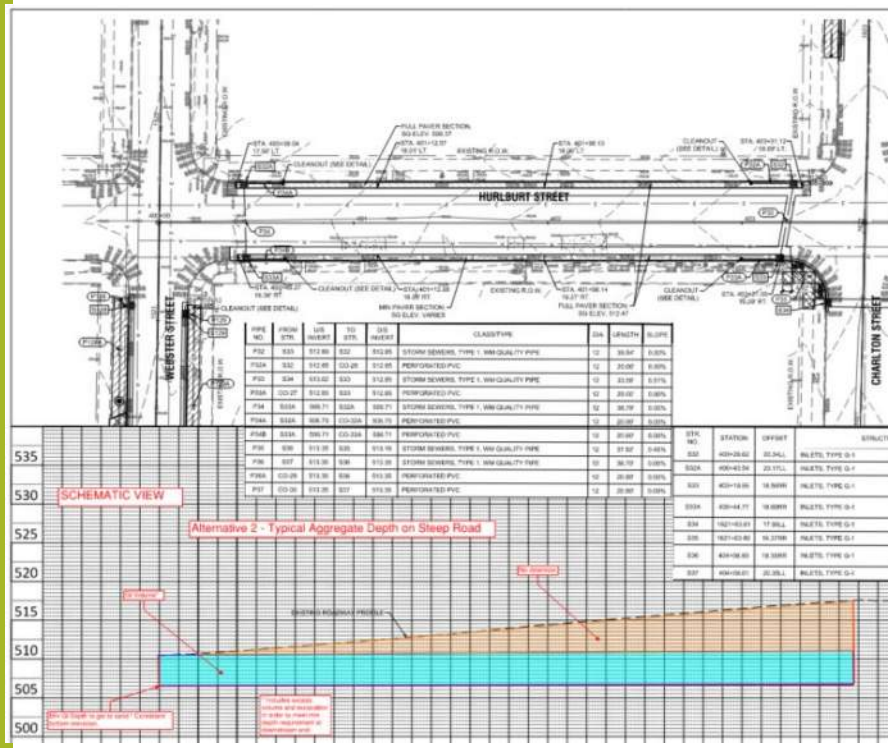
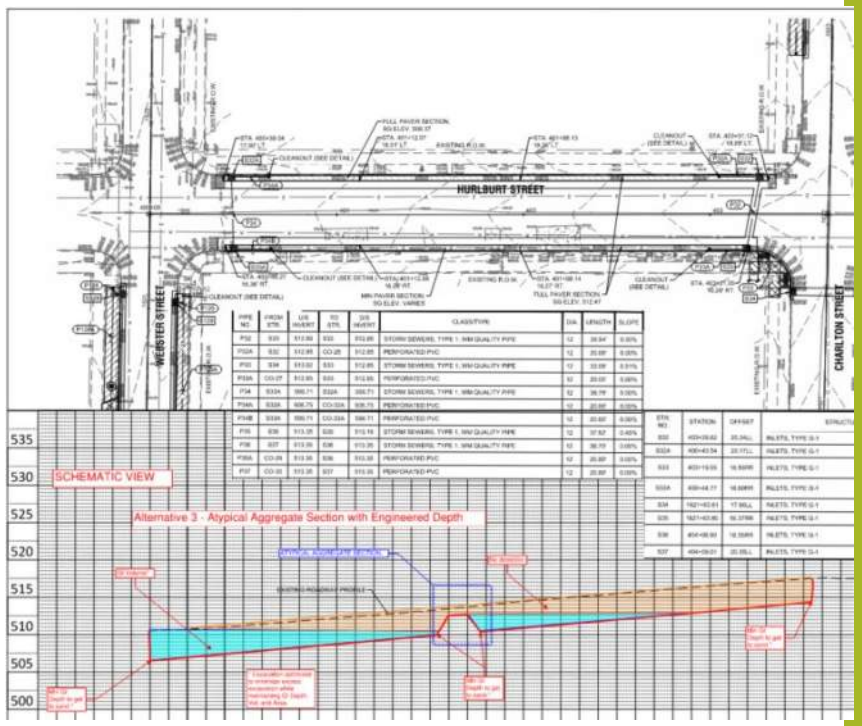
OPTIMIZING PERMEABLE PAVERS PROFILE





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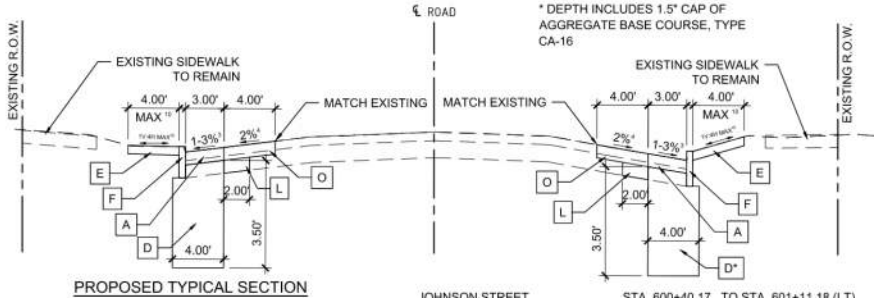
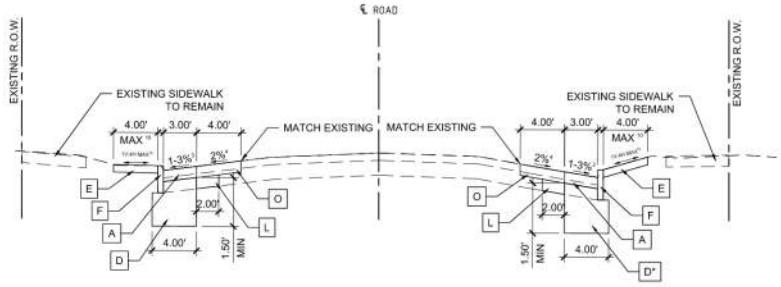
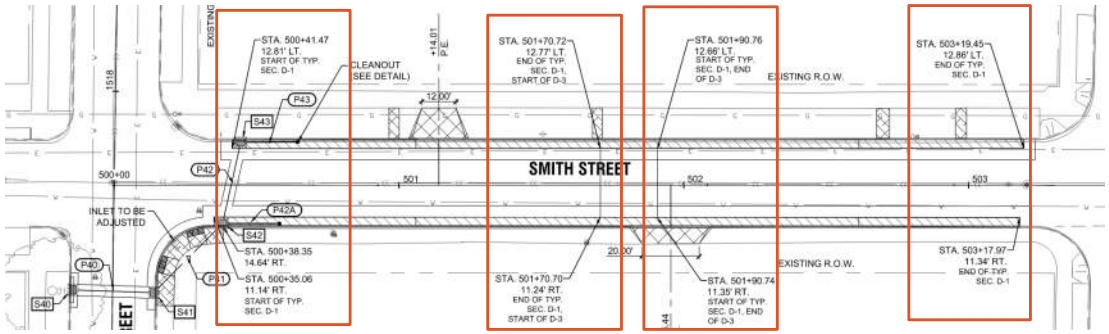
OPTIMIZING PERMEABLE PAVERS PROFILE







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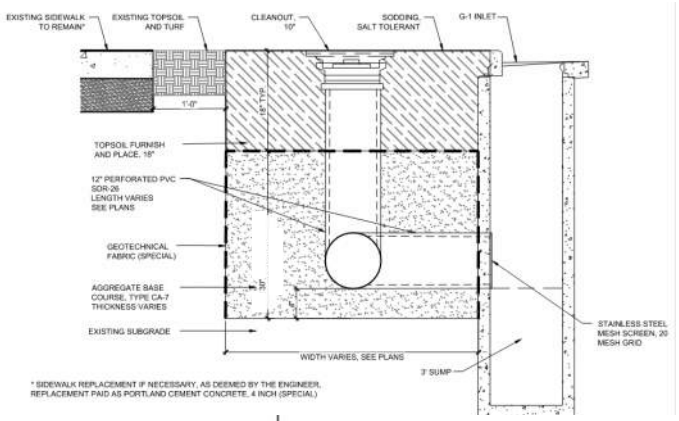
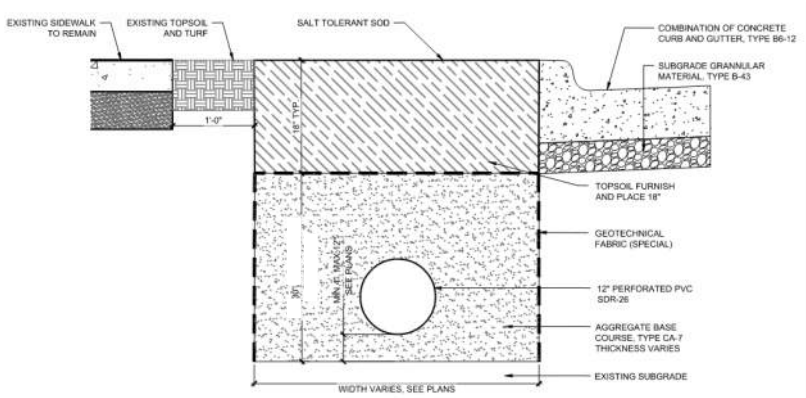
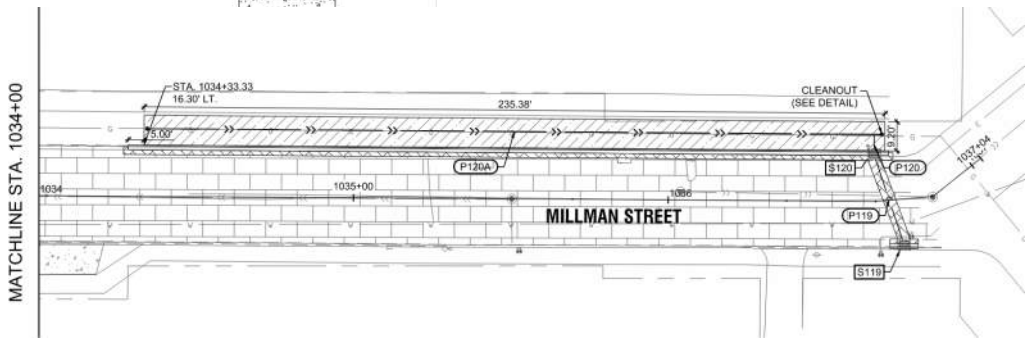
BUMPIN BIO-INFILTRATION TRENCH







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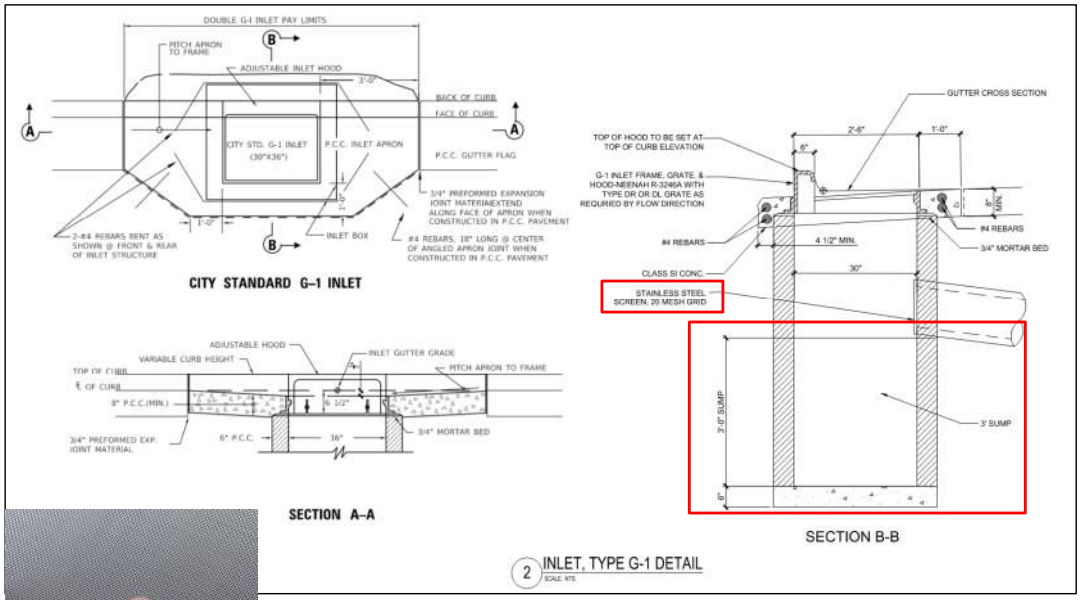
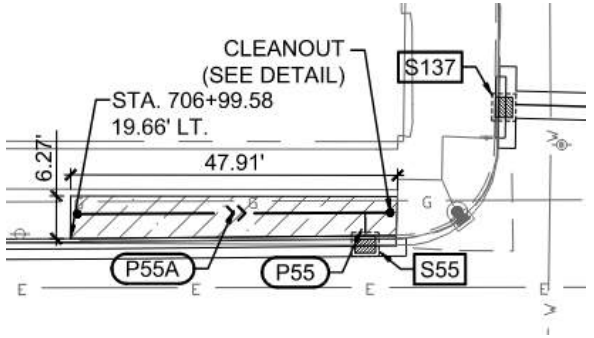
INLET



aperture 0.9mm
wire diameter 0.4mm
open area 52%



- Inlets are typically not in absolute sag points
- Steep gutters
- At intersections, gutters are steeper
- Is there a combined inlet downstream, what is downstream
- What other creative ideas to increase inlet capture?

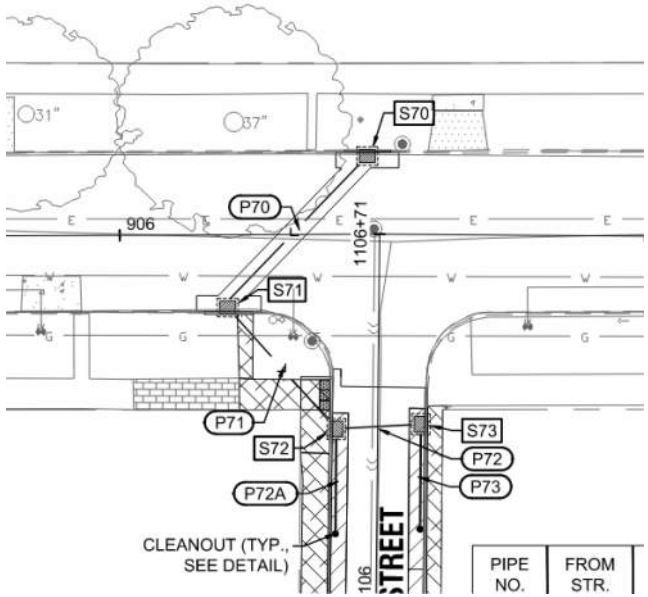
PIPES

CONVEYENCE PIPE

- They carry flow and must be designed for specific flow from upstream to downstream

EQUALIZER PIPE

- They connect two storage units to equalize hydraulic grade line and fill up storage units, simultaneously and efficiently.
- Better to be zero sloped or very close to zero
- Perforated pipes are "typically" fall under this



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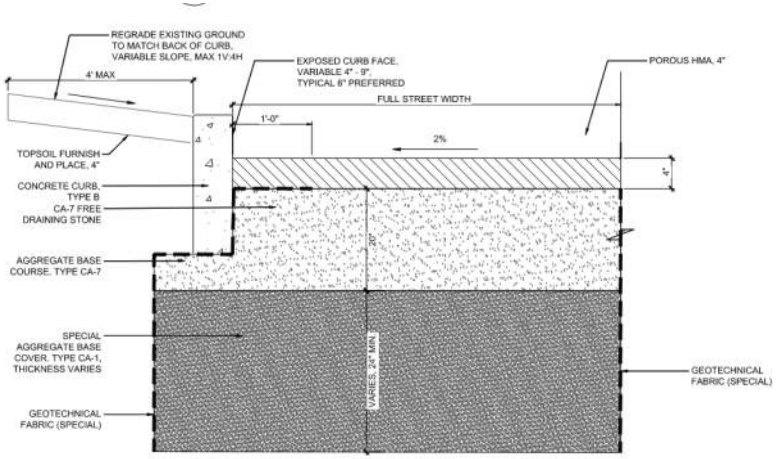
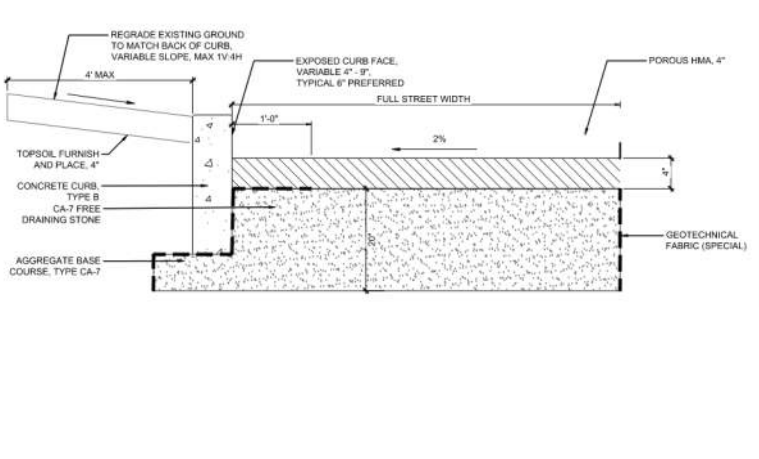
POROUS ASPHALT



5 POROUS ASPHALT FULL SECTION
SCALE: NTS



6 POROUS ASPHALT MINIMUM SECTION
SCALE: NTS

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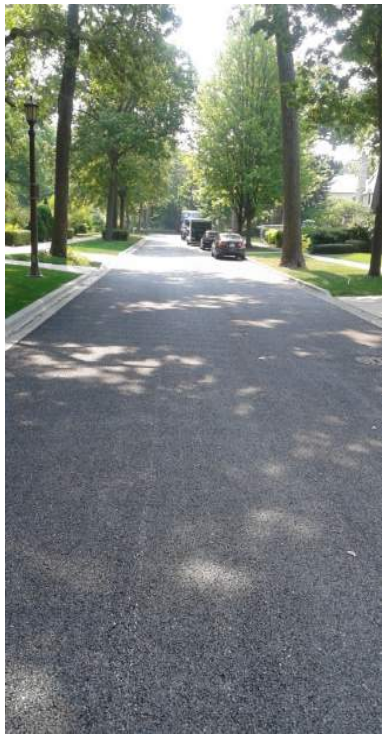
PERMEABLE PAVEMENT



Porous Asphalt

Advantages

- Cost Effective
- Quick Installation
- High storage per square foot
- Broader and continuous infiltration surface area

Disadvantages

- Traffic disruption for repairs
- More Maintenance
- Short Lifetime 9 years
- raveling – showing signs of premature wear in areas of high turning movements
- binding – where high overland flow is reaching roadway (intersecting streets, and drive aprons)
- sand veins have caused minor undercutting

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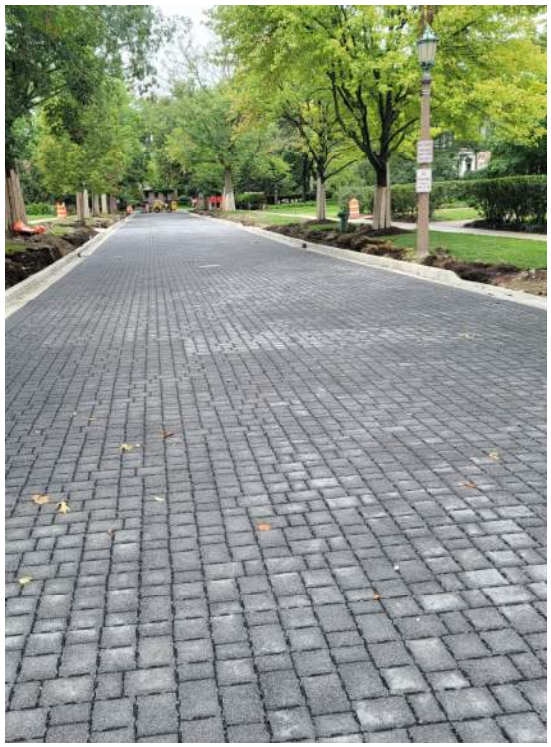
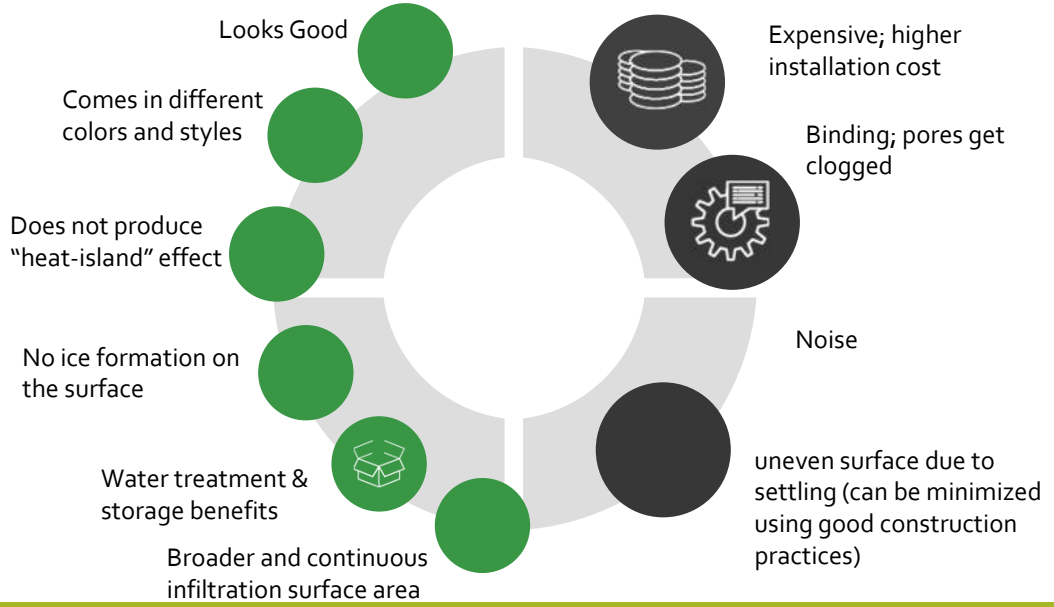
PERMEABLE PAVEMENT



Permeable Pavers

- Easy to repair
- Re-use pavers
- Long life cycle
- Minimal disruption in traffic



CITY OF PEORIA

IAFSM
Illinois Association for Floodplain and Stormwater Management

Siamak Malek, PhD PE CFM
smalek@terraengineering.com

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QUESTIONS?

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