



**Chasing I/I to Save
Capacity in the
City of Toppenish**

Gray & Osborne

Introduction

“City of Murals and Museums”

Toppenish Facts

- Population 2024 OFM, 8,915
- Geographically within the bounds of the Yakama Nation
- EPA Regulated for Wastewater
 - NPDES Permit Issued by Region 10
 - Biosolids Permit, Ecology Central Region
- Limited growth in the last 20 years
- Limited industry
 - Washington Beef has their own WWTF
 - Del Monte has limited discharge (domestic)
- Accept the bypass from the Yakama Nation Complex and Legends Casino when Yakama Nation WWTF is out of service



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Problem Statement

Collection and WWTF Issues

- City inspected over 30 manholes every Friday
 - 5-6 plug sewer calls per week
- Experienced collapsing sewers – 54% of the pipe was in “fair to poor” condition.
- City is surrounded by irrigation drains/supply canals/flood irrigated crops
- WWTF over influent capacity limits in the summer
 - Reliability/Redundancy requirements not being met
- Inefficient Treatment
 - Phosphorous Removal
 - Ammonia
 - Nitrogen Removal



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*“30 miles of pipe, 6
sewage lift stations”*

Sewage Collection Facts

- 2015 General Sewer Plan
- Total System Pipe
 - 162,431 feet = 30.76 miles
- 28 Drainage Basins
- 6 Sewage Lift Stations
 - 14-16 feet drop across the City
- 2015 GSP developed a 7 Phase Plan for sewer upgrades
 - Total Estimated Cost \$21,580,000
- City Video Investigated, approximately 30,000/54,000 LF of sewers
 - System modeled for capacity
 - Sewers were evaluated based on four conditions – Great, Good, Fair, Poor

	Total Length Assessed, FT	Percentage of Assessed System
Great	9,185	17%
Good	15,926	29%
Fair	15,884	29%
Poor	13,723	25%
Total	54,718	100%

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Wastewater Treatment

Treatment Facts

- EPA Regulated for Discharge
- WWTF Upgrade Completed 2010
 - Average Annual Flow 1.23 MGD
 - **Maximum Month Flow 1.67 MGD**
 - Maximum Day Flow 2.16 MGD
 - Peak Hour Flow 3.70 MGD
 - MM BOD5 2,581 lbs/day
 - MM TSS 2,634 lbs/day
 - MM TKN 516, lbs/day
- Notable Permit Limits
 - Ammonia, Nitrate + Nitri, Phosphorous
 - Copper, Lead, Selenium, Zinc
 - Very LOW metals limits

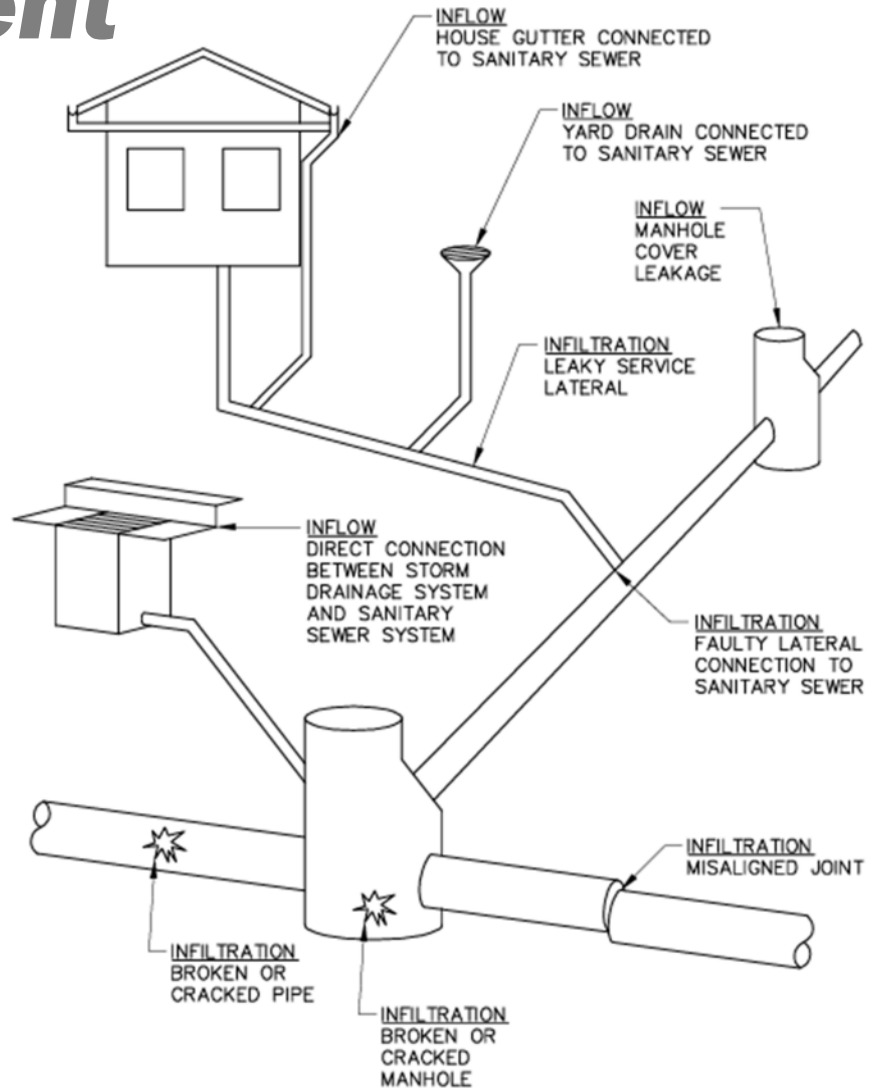


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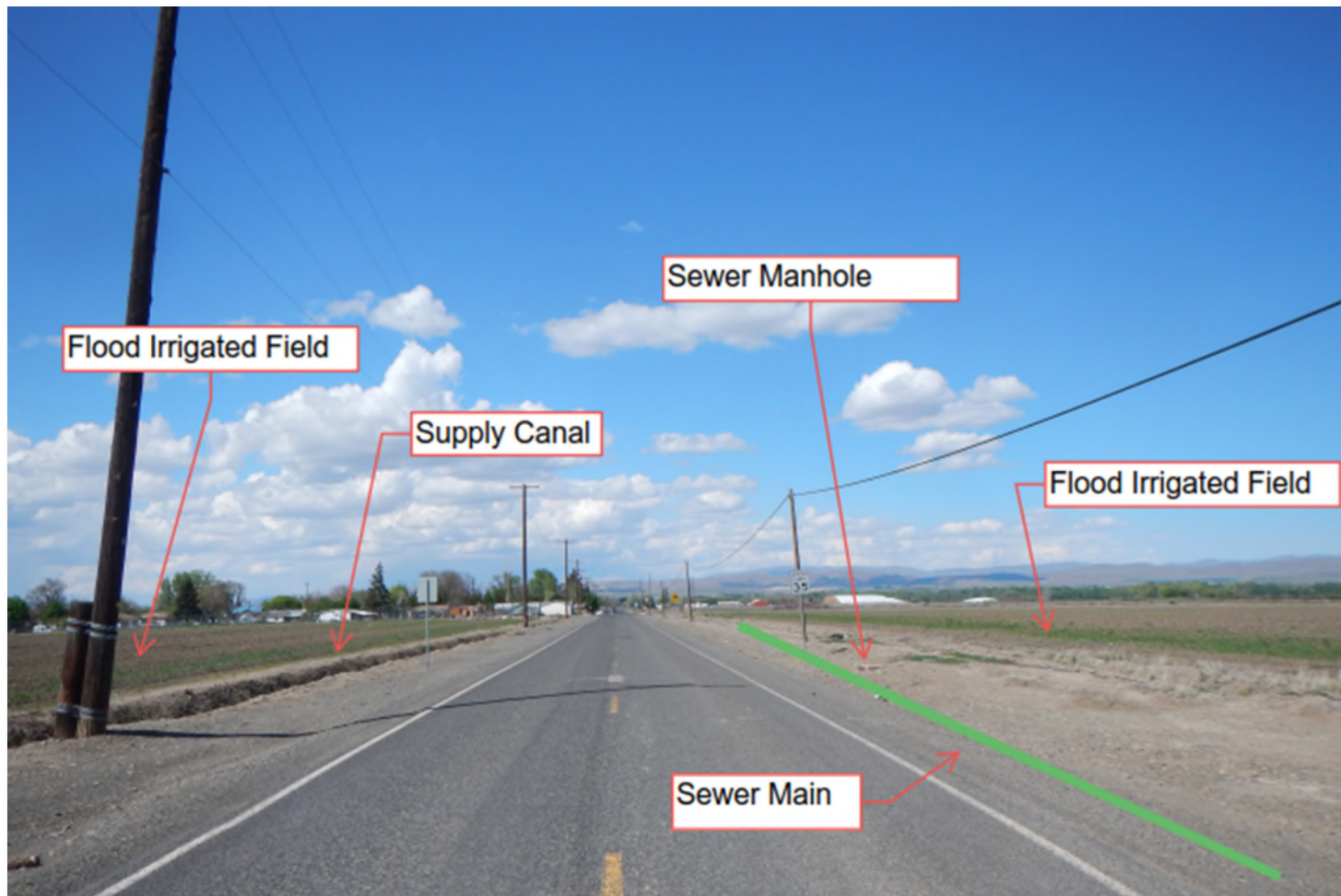
Problem Statement

Inflow/Infiltration

- Excessive I/I EPA Definition
 - 120 gpcd Infiltration Criteria
 - 274 gpcd Inflow Criteria
- Toppenish Estimated I/I Values
 - Evaluated Data 2010-2015
 - Infiltration 208 gpcd
 - Inflow 253 gpcd
- Manhole Inspection Report 2016
 - Determine Location/Magnitude of I/I
 - Monitored manholes 12 months
 - Proximity to flood irrigated fields
 - Proximity to drainage
 - Proximity to supply canals







Flood Irrigated Field

Supply Canal

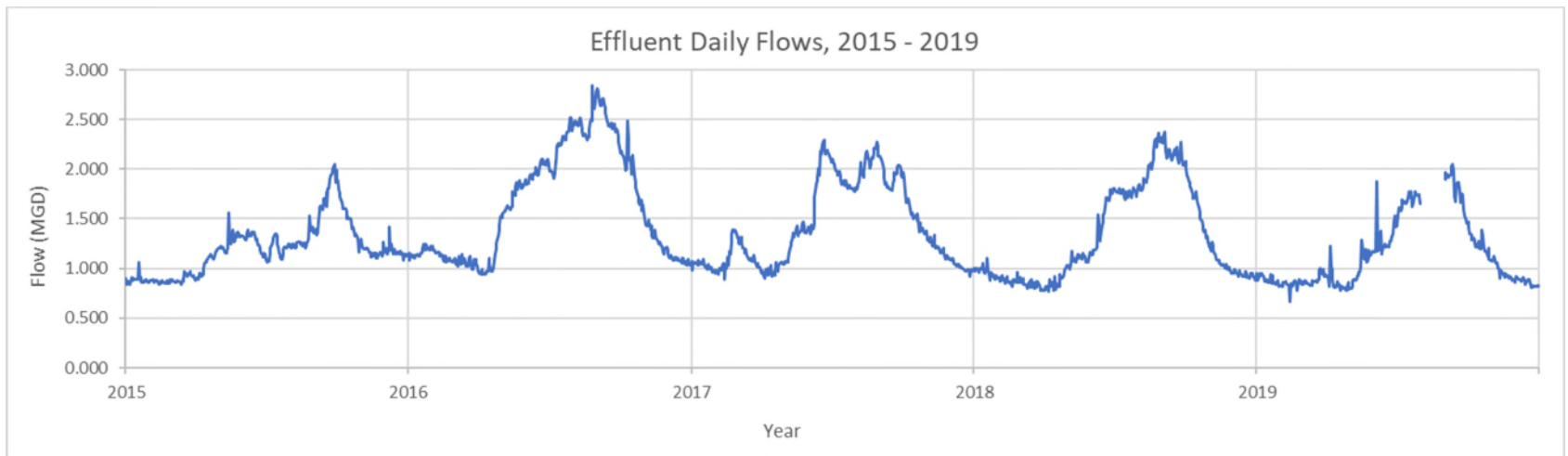
Sewer Manhole

Flood Irrigated Field

Sewer Main

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Problem Statement



Decisions

Do we chase the I/I?

Do Nothing Alternative

- Failing sewers, increased O&M/Emergency Repairs
- Failing Lift Stations
 - Buying Parts on third party websites
 - Don't meet requirements for reliability and redundancy
 - Minimal telemetry, Increased O&M
- Failing Wastewater Treatment Facility
 - Operating over capacity, running redundant equipment (pumps, blowers, etc.)
 - Barely meeting permit requirements
 - Facing significant upgrades due to flow
 - Fourth Influent Pump Installation
 - Third Primary Clarifier
 - Third Aeration Basin – constructed and equipped
 - Third Secondary Clarifier
 - Expanded UV system
 - Where would it stop?

Project Phases

Phase I – Stop Gap!

2017 Improvements

- Penny Lane Lift Station
 - Complete Replacement
 - New Structure
 - New Pumps
 - New Electrical
- 2,100 LF Pipe
 - 680 LF Side Sewers
 - 140 LF Pipe Bursting
 - 1,280 LF Open Trench Replacement

Ecology Funded - \$1,246,000

Forgivable Principal - \$448,200, 36% Grant

Standard Loan - \$797,800, 64% Loan



Project Phases

Phase IV

Phase IV Sewer System Improvements

- 21,500 LF Gravity Sewers 8-inch to 30-inch
 - 18,020 Open Cut
 - Change order to CIPP during construction
 - 3,480 LF CIPP
- 109 Manhole Replacements
- Replace Carlson Lift Station – 625 GPM
 - New Structure, moved structure out of the street.
 - New Pumps, New Electrical, Emergency Power
 - Integral VFD Submersible Pumps (Interchangeable with other Lift Stations)
- Replace South Beech Lift Station – 175 GPM
 - New Structure
 - New Pumps, New Electrical, Emergency Power
 - Integral VFD Submersible Pumps (Interchangeable with other Lift Stations)

Project Phases

Phase III, II

Phase III Sewer System Improvements

- 24,000 LF Gravity Sewers 8-inch to 27-inch
 - 21,889 Open Cut
 - Change order to CIPP during construction
 - 2,111 LF CIPP
- 120 Manhole Replacements
- Replace Branding Iron Lift Station – 220 GPM
 - New Pumps, New Electrical, Emergency Power
 - Integral VFD Submersible Pumps (Interchangeable with other Lift Stations)

Phase II Sewer System Improvements

- 14,000 LF Gravity Sewers 8-inch to 27-inch
 - 12,530 Open Cut
 - 1,470 LF CIPP
- 120 Manhole Replacements

Project Construction

Carlson Lift Station

- Caisson construction
- Moved from street to edge of road.



Project Construction

Dewatering Operation

- Water Code Permit
- Wapato Irrigation Project Permit



Project Construction

Typical Alley Construction

- City reclaimed some alley property
- Narrow operating corridor
- Numerous utilities



Overall Success

Immediate!

Phase IV

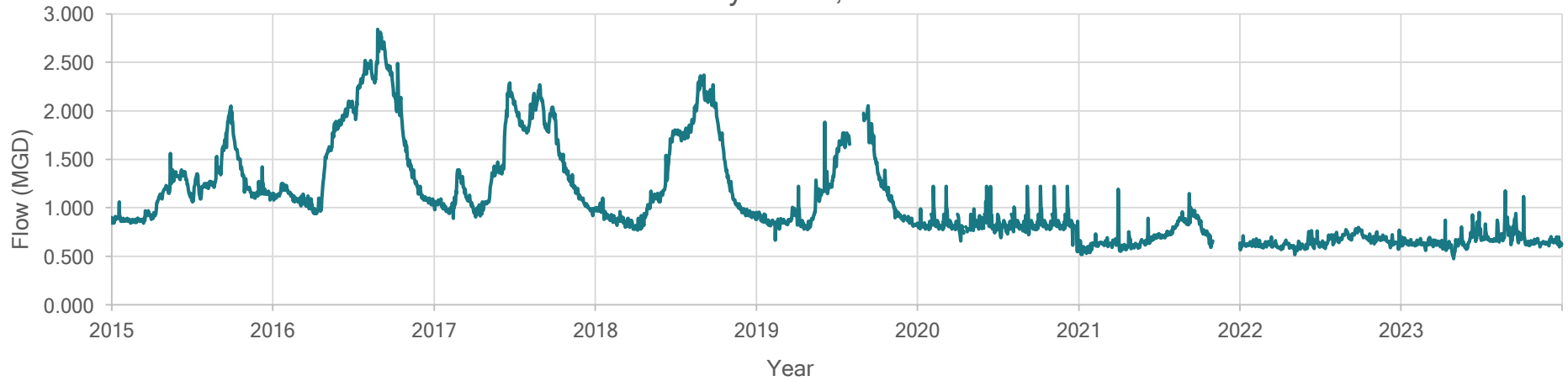
- Construction Started January/February 2020
 - Delay to start due to COVID – minimal effects of COVID once project started
- SUMMER 2020 – Flows only exceeded 1 MGD, 4 times!
- SUMMER 2021 – Flows exceeded 1 MGD 1 time!
- SUMMER 2022 – Flows never exceeded 1 MGD!
- SUMMER 2023 – Flows exceeded 1 MGD 2 times!
- Manhole Inspections – not done on a weekly basis, rarely have sewer plugs
- Reliable Lift Stations – low O&M, power efficiency – low power bills
- Phosphorous – below 1 mg/L, easily!
- Nitrate + Nitrite – below 1 mg/L, easily!

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I/I Reduced by 2 MGD

(summer)

Effluent Daily Flows, 2015 - 2023



Overall Success

Things to think about!

General

- “Minor Changes” bid item is a must!
 - Not allowed by Rural Development
- Develop a procedure for dry side sewers
 - Side sewers are a source of I/I, who determines when to abandon?
- Dewatering plan
 - Where will contractor dispose of the water?
- Potholes required in advance
 - Contract documents give Engineer/Owner time to develop solutions (1-week)
 - Get information from Contractors on potholes for the record drawings
- Pre-Camera and Post-Camera
 - Put it on the Contractor if a side sewer is missed.

Field Notes

Things to think about!

General

- Asphalt Replacement
 - Poor streets were difficult to “patch”
 - Sewer funding couldn't be use to repave entire streets
 - Public perception is that the project made the streets worse – in turn, they were actually better.
 - Construction standards up to date
- Traffic Control in Critical Areas
 - Schools – potentially halt work during drop off and pickup.
 - Hospitals/Emergency Services – require the contractor to stick to the Plan!
- Winter work
 - Required for this Contract due to the groundwater
 - Messy – plan for resurfacing entire alley, not “patch”

Field Notes

Existing Utilities

General

- Review franchise agreements, bring them up to date

Natural Gas

- City had high pressure and low pressure gas
 - Excavations near high pressure gas required an inspector
 - Residential gas was not well marked.
 - Never have enough potholes! Maybe done more in advance?

City Underdrain

- Numerous Conflicts
- Old installed with sewer, concrete joint pipe – separation issues

City Water

- Numerous service lines were bad
 - Have a plan for responsibility and replacement – staff time, delays

Success!

Comes at a Price

Total Funding Package

	Grant	Loan	Sewer Reserves
Ecology Grant	\$2,299,228	\$4,071,272	
RD Grant	\$8,338,500	\$4,263,000	
City Funding			\$1,400,000
Total	\$10,637,728	\$8,334,272	\$1,400,000
Total Funding = \$20,372,000			
Percentage	52%	41%	7%

City Sewer Rate = \$104/month including 30% utility tax, effective rate \$74/month



Gray & Osborne, Inc.

CONSULTING ENGINEERS

Questions?

