



# Brighton Wastewater Master Plan

Presentation

June 13, 2017



# MARTIN/MARTIN –Civil and Structural Engineering

- Comprehensive Experience / Resources / Unique – Proactive Approach
- Wastewater / Water Planning; Treatment Processes; GIS Mapping; Flow & Population Projections; Modeling; Cost Benefit Analysis
- Municipal Work; Alternatives Investigation; Design Expertise
- Program Capital Improvements; Long Range Planning
- Tailor Services To Client Needs

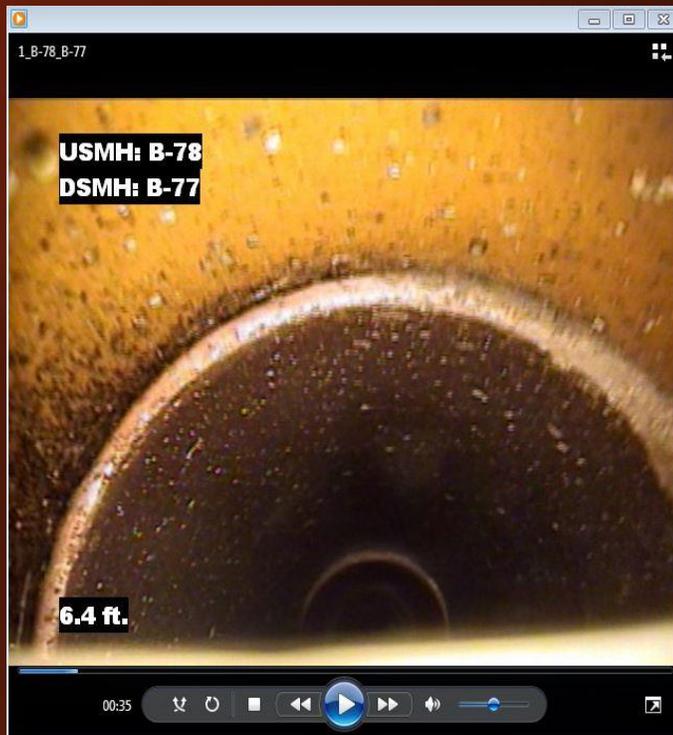


# Reasons to have a Wastewater Master Plan

- Evaluate Existing Sanitary Collection and Treatment Systems
- Support Future Growth
- Identify Potential Capital Improvements
- Long Range Facility Planning – Budgeting
- Record of Findings
- Dynamic Informed Decisions



# PHOTOS OF REASONS FOR A WASTEWATER MASTERPLAN



# INTRODUCTION

- Purpose

- Wastewater Master Plan
- Evaluation of Existing and Future Growth
- 5-yr / 10-yr / 20-yr (Buildout)
- Consistency with Updated Comprehensive, Water & Transportation Plans
- Wastewater Treatment Evaluation
- Sanitary Transmission Capacity Analysis
- Capital Improvements (Phasing and Trigger Points for Development)
- North Treatment Plant Flows
- DYNAMIC MODEL - REPORT



# Tasks to Prepare the Master Plan

- Treatment Plant Evaluation
- Planning / Zoning / Land-Use
- GIS Mapping and Attribute Data
- Flow Projections
- Flow Monitoring





# Tasks to Prepare the Master Plan

- Hydraulic Modeling
- Existing System Analysis
- Future System Analysis (5 / 10 / 20 – Buildout)
- Capital Improvements – Phasing – Cost Estimates
- Master Plan Report
- On-Going Model Updates



# Planning & System Conditions

- Service Area - Approximately 18,000 Acres
- Area Serviced By Lochbuie Facility 3,200 Acres
- 844,000 Lineal Feet of Collection System
- 185,700 Lineal Feet of Transmission Mains (12" to 36")
- 8 – Lift Stations
- 3 Million Gallon per Day Wastewater Facility
- Maximum 80% Capacity – Begin Improvement Design



# Sanitary Transmission Lines

| Material      | Length (LF) | Diameter (in.) | Length (LF) |
|---------------|-------------|----------------|-------------|
| PVC           | 139,254.67  | 10             | 159.33      |
| VCP           | 40,718.91   | 12             | 29,977.65   |
| <b>Total:</b> | 179,973.58  | 15             | 33,079.56   |
|               |             | 16             | 3,823.00    |
|               |             | 18             | 29,634.76   |
|               |             | 21             | 39,068.49   |
|               |             | 24             | 26,052.22   |
|               |             | 27             | 1,997.43    |
|               |             | 30             | 11,157.45   |
|               |             | 36             | 5,023.69    |
|               |             | <b>Total:</b>  | 179,973.58  |





# Wastewater Treatment Plant Evaluation

- The WWTP has been very well maintained
- Only improvements recommended are to meet existing and future regulatory requirements.
- Future connections



# Population & Flow Projections

- Single Family Residential Equivalent (SFRE)
- 175 gallons per day per SFRE (GPD/SFRE)

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| Land Use               | Unit Wastewater Flow Rate |
|------------------------|---------------------------|
| Industrial             | 1,500 gallons/acre/day    |
| Commercial             | 1,000 gallons/acre/day    |
| Park/Recreation        | 50 gallons/acre/day       |
| Elementary Schools     | 13 gallons/student/day    |
| Jr. & Sr. High Schools | 20 gallons/student/day    |

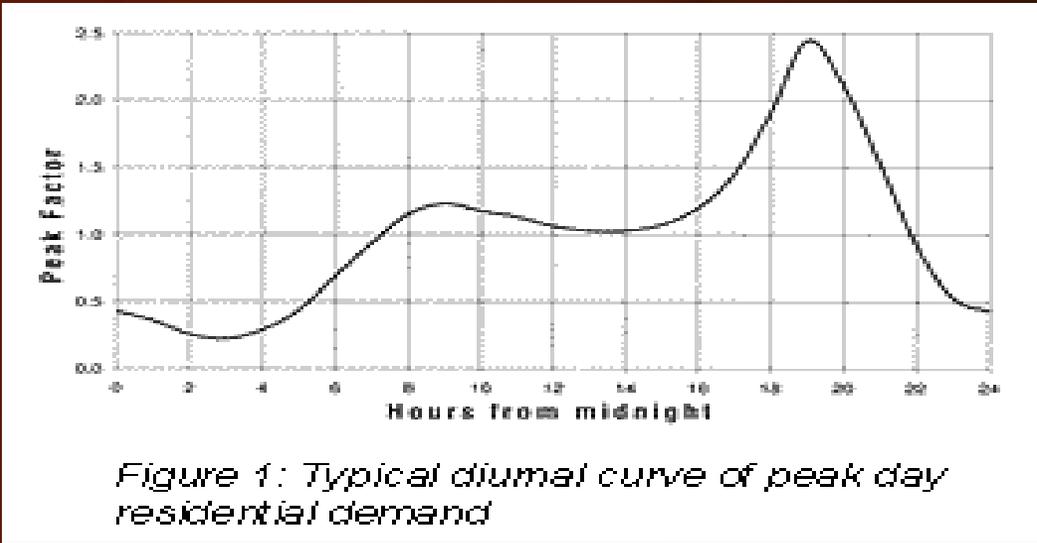
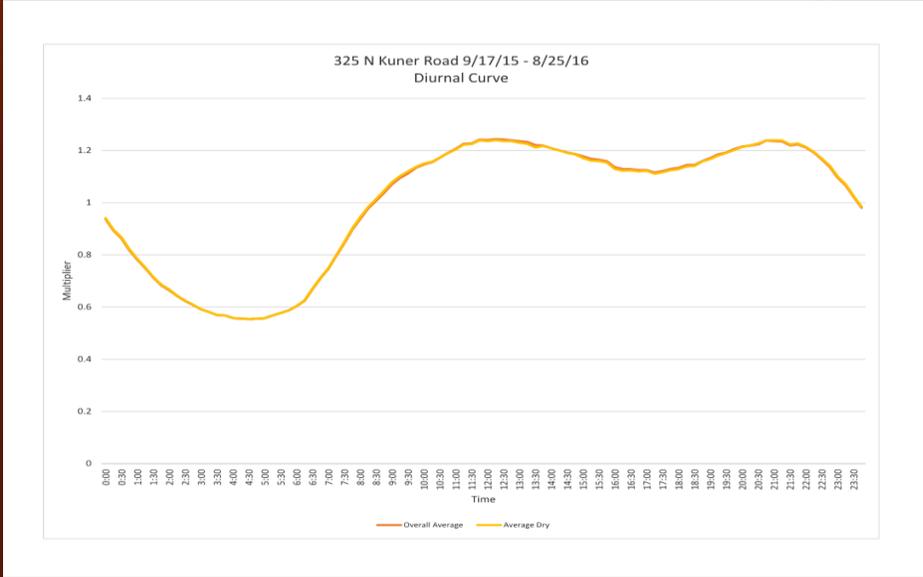
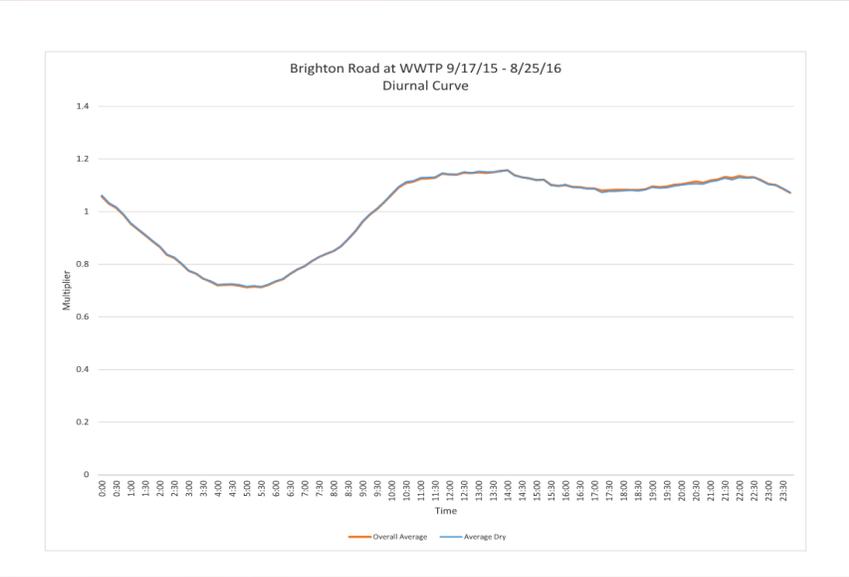


# Population & Flow Projections

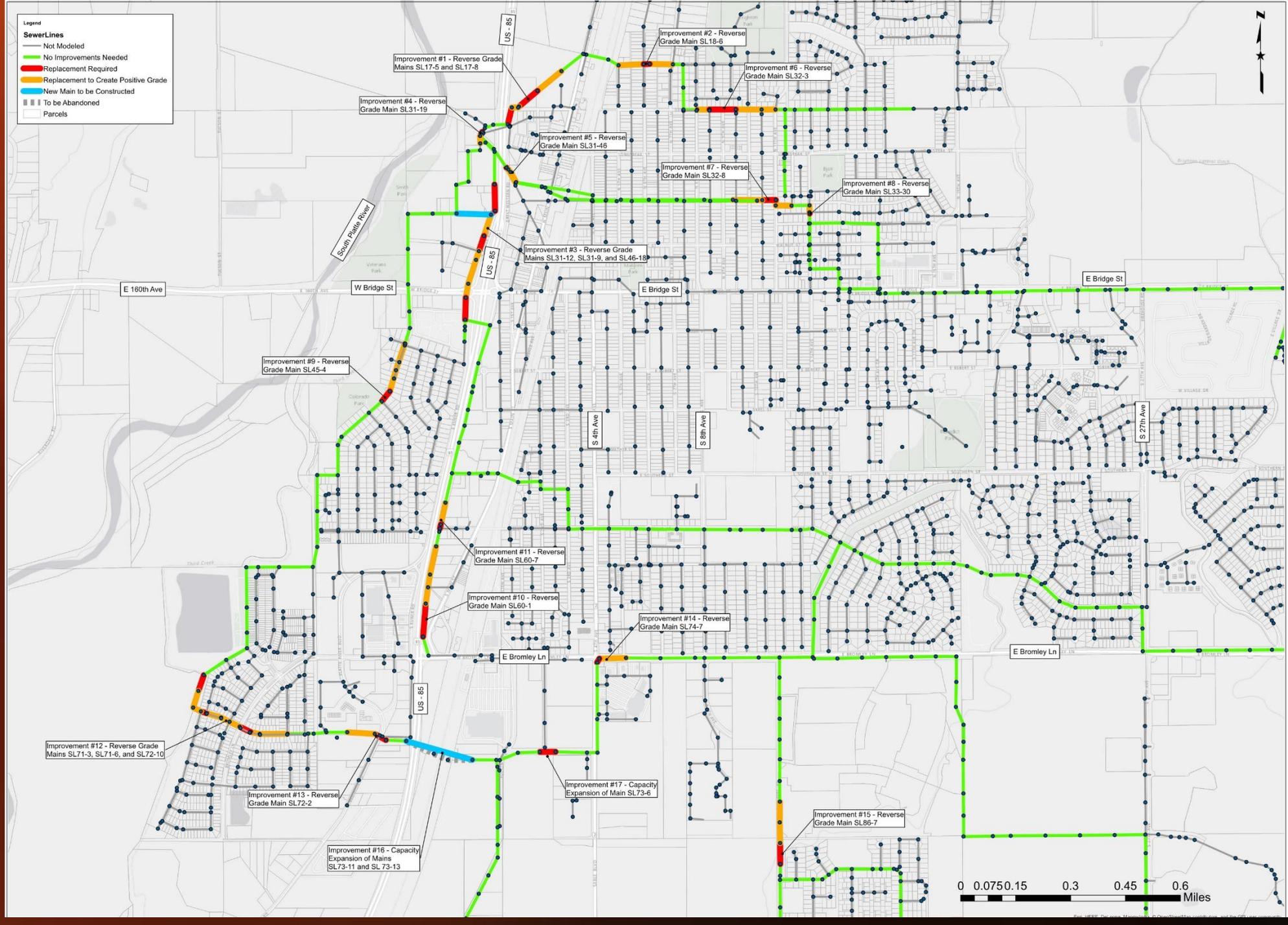
|            | Existing | 5 – year Short Term | 10 – Year Medium Range | 20 – Year Build Out |
|------------|----------|---------------------|------------------------|---------------------|
| SFRE       | 14,230   | 20,462              | 28,711                 | 56,455              |
| Flow (avg) | 2.49 mgd | 3.58 mgd            | 5.02 mgd               | 9.88 mgd            |



# EXAMPLES – DIURNAL CURVES



# Recommended Sanitary Sewer System Improvements Build-Out



# Sanitary Mains Requiring Improvement

| Pipe ID       | From ID | To ID   | Diameter (in) | Length (ft)     | Pipe Slope | Model d/D Ratio |
|---------------|---------|---------|---------------|-----------------|------------|-----------------|
| SL17-5        | MH17-5  | MH17-6  | 24            | 347.48          | -0.16%     | 1.0             |
| SL17-8        | MH17-8  | MH31-17 | 24            | 251.88          | -0.04%     | 1.0             |
| SL18-6        | MH18-6  | MH18-7  | 24            | 84.64           | -0.37%     | 1.0             |
| SL31-12       | MH31-12 | MH31-13 | 24            | 381.24          | -0.01%     | 1.0             |
| SL31-19       | MH31-19 | MH31-20 | 24            | 66.78           | -0.36%     | 1.0             |
| SL31-46       | MH31-46 | MH31-38 | 18            | 39.13           | 0.33%      | 0.378           |
| SL31-9        | MH31-9  | MH31-10 | 24            | 231.29          | -0.02%     | 1.0             |
| SL32-3        | MH32-3  | MH32-4  | 18            | 377.9           | -0.10%     | 1.0             |
| SL32-8        | MH32-8  | MH32-9  | 21            | 195.08          | -0.46%     | 1.0             |
| SL33-30       | MH33-30 | MH33-31 | 18            | 18.59           | -8.55%     | 1.0             |
| SL45-4        | MH45-4  | MH45-5  | 30            | 182.81          | -0.16%     | 1.0             |
| SL46-18       | MH46-18 | MH46-19 | 24            | 319.3           | -0.05%     | 1.0             |
| SL60-1        | MH60-1  | MH60-2  | 15            | 481             | -0.35%     | 1.0             |
| SL60-7        | MH60-7  | MH60-7A | 21            | 59.19           | -0.34%     | 1.0             |
| SL71-3        | MH71-3  | MH71-4  | 24            | 80.31           | 0.01%      | 1.0             |
| SL71-6        | MH71-6  | MH71-7  | 30            | 260.74          | 0.02%      | 0.817           |
| SL72-10       | MH72-10 | MH72-11 | 24            | 172.81          | -0.47%     | 1.0             |
| SL72-2        | MH72-2  | MH72-3  | 24            | 181.95          | -0.15%     | 1.0             |
| SL73-11       | MH73-11 | MH73-12 | 24            | 354.96          | 0.01%      | 1.0             |
| SL73-13       | MH73-13 | MH72-1  | 24            | 438.86          | 0.04%      | 1.0             |
| SL73-6        | MH73-6  | MH73-7  | 24            | 227.7           | 0.02%      | 1.0             |
| SL74-7        | MH74-7  | MH73-1  | 24            | 70.03           | -1.68%     | 1.0             |
| SL86-7        | MH86-7  | MH86-8  | 15            | 303.16          | -1.18%     | 1.0             |
| <b>Total:</b> |         |         |               | <b>5,126.83</b> |            |                 |

# Engineer's Opinion of Probable Cost

| Main ID       | Size | Length (LF) | Reason        | Required Length (ft) | Required Diameter (in) | # of MHs | Phase Required | Estimated Cost          |
|---------------|------|-------------|---------------|----------------------|------------------------|----------|----------------|-------------------------|
| SL17-5        | 21   | 347.48      | Reverse Grade | 579.83               | 21                     | 2        | Existing       | \$ 365,976.00           |
| SL17-8        | 21   | 251.88      | Reverse Grade | 579.83               | 21                     | 2        | Existing       | \$ 365,976.00           |
| SL18-6        | 21   | 84.66       | Reverse Grade | 783.57               | 21                     | 2        | Existing       | \$ 592,848.00           |
| SL31-12       | 24   | 381.24      | Reverse Grade | 381.24               | 24                     | 0        | Existing       | \$ 654,764.00           |
| SL31-19       | 24   | 66.78       | Reverse Grade | 172.75               | 24                     | 1        | Existing       | \$ 127,305.00           |
| SL31-46       | 18   | 39.13       | Reverse Grade | 477.31               | 18                     | 1        | Existing       | \$ 333,684.00           |
| SL31-9        | 24   | 231.29      | Reverse Grade | 1,036.11             | 24                     | 3        | Existing       | \$ 654,764.00           |
| SL32-3        | 18   | 377.90      | Reverse Grade | 1,131.32             | 18                     | 3        | Existing       | \$ 831,312.00           |
| SL32-8        | 21   | 195.08      | Reverse Grade | 929.64               | 21                     | 3        | Existing       | \$ 708,354.00           |
| SL33-30       | 18   | 18.59       | Reverse Grade | 117.39               | 18                     | 1        | Existing       | \$ 108,330.00           |
| SL45-4        | 30   | 182.67      | Reverse Grade | 434.60               | 30                     | 1        | Existing       | \$ 754,998.00           |
| SL46-18       | 24   | 319.30      | Reverse Grade | 1,036.11             | 24                     | 3        | Existing       | \$ 654,764.00           |
| SL60-1        | 15   | 481.00      | Reverse Grade | 1,324.27             | 15                     | 3        | Existing       | \$ 1,039,140.00         |
| SL60-7        | 21   | 59.19       | Reverse Grade | 382.24               | 21                     | 1        | Existing       | \$ 335,340.00           |
| SL72-10       | 24   | 172.81      | Reverse Grade | 719.61               | 24                     | 3        | Existing       | \$ 495,190.00           |
| SL72-2        | 24   | 182.13      | Reverse Grade | 580.02               | 24                     | 1        | Existing       | \$ 373,704.00           |
| SL74-7        | 24   | 64.49       | Reverse Grade | 450.99               | 24                     | 1        | Existing       | \$ 354,660.00           |
| SL86-7        | 15   | 303.16      | Reverse Grade | 902.29               | 15                     | 2        | Existing       | \$ 791,430.00           |
| SL71-3        | 24   | 80.31       | Capacity      | 719.61               | 24                     | 0        | 10-Year        | \$ 495,190.00           |
| SL71-6        | 30   | 260.74      | Capacity      | 495.67               | 30                     | 0        | Buildout       | \$ 495,190.00           |
| SL73-11       | 24   | 354.96      | Capacity      | 500.00               | 27                     | 0        | 10-Year        | \$ 481,016.25           |
| SL73-13       | 24   | 438.86      | Capacity      | 491.54               | 27                     | 0        | Buildout       | \$ 481,016.25           |
| SL73-6        | 24   | 227.70      | Capacity      | 227.70               | 27                     | 0        | Buildout       | \$ 150,006.00           |
| <b>Total:</b> |      |             |               |                      |                        |          |                | <b>\$ 11,644,957.50</b> |

# Estimated Costs

| Costs in 2017 \$       | Existing  | 5 – year Short Term | 10 – Year Medium Range | 20 – Year Build Out |
|------------------------|-----------|---------------------|------------------------|---------------------|
| Reverse Grade Lines    | \$9.54 M  | \$0                 | \$0                    | \$0                 |
| Improvement Lines      | \$990,000 | \$0                 | \$480,000              | \$150,000           |
| TOTAL -<br>Cummulative | \$10.53 M | \$10.53 M           | \$11.01 M              | \$11.16 M           |



# Conclusions

- Verify Reverse Grade Line Segments
- Initiate Existing Condition Improvements
- Budget for Future Capital Improvements
- Continue to Update the Model as Development Occurs

Questions?

