“You CAN Compete with the Private Sector”

The City of Lawton, OK.
City Wide Sewer Rehabilitation Program

“You Can Compete with the Private Sector!”

Jerry Ihler, P.E. Public Works
Director/City Engineer
Rusty Whisenhunt, Assistant
Director of Sewer Rehab & Collections

The City of Lawton

Lawton / Fort Sill
Population: 97,365

Oklahoma
History
- EPA Administrative Order - September, 1994
- Reasons:
  - Noncompliance with NPDES Permit.
  - Unauthorized Overflows from the Sewer Collection System.

SSO Contributing factors
- Concrete Pipe
  - 70% of collection system
  - Proximity of pipe manufacturing plants
  - Effects of H₂S Gas

Consent Order Agreement (May 1995)
- Participants
  - Oklahoma Department of Environmental Quality (ODEQ)
  - EPA
  - City of Lawton

To Perform SSES
The SSES

- SSES was performed to identify
  - Necessary Repairs
  - Required Expansions

- Goals
  - Eliminate Sanitary Sewer Overflows (SSOs)
  - Reduce Inflow/Infiltration
  - Improve Pipe Carrying Capacity

- Scope of work
  - 37 Flow meters
  - Three (3) Drainage Basins
  - Physical inspection
  - 6,094 manholes & 400 miles of sewerline
  - T.V. Inspection (CCTV)
  - 11.000 L.F. televised
  - System modeling
  - 10" and larger – approximately 100 miles
  - Smoke testing
  - 1,614,000 L.F. based on
  - Rehabilitation/Expansion recommendations with costs

Cost Summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Estimated Cost (1996 DOLLARS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manhole Rehab</td>
<td>1,625 ea.</td>
<td>$698,000</td>
</tr>
<tr>
<td>Mainline Rehab</td>
<td>191,000 L.F.</td>
<td>$18,986,000</td>
</tr>
<tr>
<td>Expansion/Upgrade</td>
<td>92,500 L.F.</td>
<td>$20,700,000</td>
</tr>
<tr>
<td>Wet Weather Facility</td>
<td>15 MGD 1-ea.</td>
<td>$2,250,000</td>
</tr>
<tr>
<td><strong>Sub-Total Construction</strong></td>
<td></td>
<td><strong>$42,634,000</strong></td>
</tr>
<tr>
<td>Engineering / Inspection</td>
<td>LS</td>
<td>$4,466,000</td>
</tr>
<tr>
<td>Contingencies</td>
<td>LS</td>
<td>$5,460,000</td>
</tr>
<tr>
<td><strong>Sub-Total(Eng./Contingencies)</strong></td>
<td></td>
<td><strong>$9,926,000</strong></td>
</tr>
<tr>
<td>City Maintenance Rehab</td>
<td>LS</td>
<td>$7,500,000</td>
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<td>Admin of Private Service</td>
<td>LS</td>
<td>$680,000</td>
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<td>Flow Monitor Assessment</td>
<td>LS</td>
<td>$510,000</td>
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<tr>
<td><strong>Estimated Grand Total</strong></td>
<td></td>
<td><strong>$61,250,000</strong></td>
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</table>

Program Schedule

- City of Lawton requested three construction phases
  - Phase I - Includes the first 10 sub-basins (NuMuCreek Basin) and the first 7 expansion/upgrade projects.
  - Phase II - Address the 14 sub-basins (Wolf Creek Basin) and 10 expansion/upgrade projects.
  - Phase III - Address the 14 sub-basins (Cache Creek Basin) and 9 expansion/upgrade projects.
  - Proposal was approved in September 1997.
The SSE S

Conclusion of Study

- System Rehabilitation Recommendations:
  - The City must reduce the wet weather inflow by 25% to 30%
  - Areas that the City must focus on to achieve reduction:
    - Public Mainlines
    - Private Service Lines
    - Manholes
  - Only defects that contribute to system overflows were scheduled for repair (later expanded to include additional high maintenance sewer mains).
  - The City should clean and inspect 400,000 linear feet of line per year.
  - 1,625 manholes were identified for some type of rehab work.
  - 191,000 linear feet of mainline segments were identified for rehab.
  - 2,109 private service lines were identified for rehab.
  - 92,500 linear feet of expansion/upgrade projects were identified (26 projects).
  - 1- (15) million gallon wet weather facility constructed at WWTP for wet weather flows.
How is the City of Lawton going to meet this task?

Mayor/Council Requested Staff Proposals
In-House vs Private Sector

Proposal For Design/Construction Divisions

- Benefits for In-House Design/Construction
  - Phase I savings of $2.6 million
  - Cost Savings would come through:
    - Omitting costly contract modifications (i.e. change orders, amendments)
    - Design-Build projects should save time
    - Established relationships with other utility owners
    - Working knowledge of existing system
    - No profit

Proposal For Design/Construction Divisions

Phase I Sewer Rehabilitation Program Cost Comparisons

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Type</th>
<th>1996 Contract Costs</th>
<th>1996 Other Costs</th>
<th>Total Costs</th>
<th>Inflated Contract Costs</th>
<th>Inflated Other Costs</th>
<th>Inflated Total Costs</th>
<th>1996 In-House Contract Costs</th>
<th>1996 In-House Other Costs</th>
<th>1996 In-House Total Costs</th>
<th>Inflated In-House Contract Costs</th>
<th>Inflated In-House Other Costs</th>
<th>Inflated In-House Total Costs</th>
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<tr>
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<td>98-99</td>
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<td>503,275</td>
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<td>2,649,000</td>
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<td>2,781,450</td>
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<td>901,000</td>
<td>3,747,000</td>
<td>4,648,000</td>
<td>991,100</td>
<td>4,121,700</td>
<td>5,112,800</td>
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<td>596,000</td>
<td>2,385,000</td>
<td>2,981,000</td>
<td>670,500</td>
<td>2,683,125</td>
<td>3,353,625</td>
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<td>651,000</td>
<td>2,660,000</td>
<td>3,311,000</td>
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<tr>
<td>Totals</td>
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<td>4,321,000</td>
<td>17,587,000</td>
<td>21,908,000</td>
<td>4,662,800</td>
<td>18,971,575</td>
<td>23,634,375</td>
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</table>

* The 1996 numbers represent those provided in the Sanitary Sewer Evaluation Survey (SSES) prepared by Biggs and Mathews, Inc. (SSES Consultant) and which were submitted to the Oklahoma Department of Environmental Quality (ODEQ). As a result, the ODEQ issued a consent order to construct Phase I of the Sewer Rehabilitation Program. It should be noted that the 1996 numbers do not incorporate an inflation factor for any of the Program Years.

* The Contract and In-House Costs include a 2 1/2% per year inflation factor.

* Other Costs consist of Engineering, Inspection, Flow Monitoring, Private Service Line Administration, etc.
Funding

- Capital Improvements Program (CIP) $ 5,507,359
- Oklahoma Water Resources Board SRF Loans $15,397,307
Total Funding $20,904,666

Repayment of SRF Loans: Utility Bill - $2.35/mo. for 20 years

Building the Construction Division

- First steps in building the construction division
  - Staffing
  - Select construction technologies
  - Material and Equipment specs had to be written and approved
  - Bidding procedures had to be followed
  - Equipment purchased

Proposal for Construction Division

(Sepetember 1998)
Sewer Construction Division
Building the Construction Division

- Evaluation of Available Technologies
  - CIPP (1.0%)
  - Fold and Form / Slip lining (1.0%)
  - Directional Bore (8%) 
  - Pipe Bursting (54%)
  - Conventional Open-trench (36%)

Building the Construction Division

- Equipment Purchasing
  - Based on Technology
    - Pipe Bursting
    - Pneumatic Bursting Equipment
    - Electro Fusion
      - Fusion tapping saddles
      - Fusion collars
    - Butt Fusion of HDPE pipe
    - Directional Boring
    - Conventional
    - Specifications
    - Bids
    - Delivery (60 day max delivery)

- Material Purchasing
  - Selection of materials
    - HDPE, PVC, FITTINGS, AGGREGATE, Etc.
  - Write Specs., Bid, and Award Contracts
  - Yearly contracts to allow purchasing as needed

The City of Lawton, Sewer Construction Division is Ready to Begin Construction.

Construction
Council approved In-House Construction Program. (September 1998)
Equipment started arriving. (January 1999)
Crew personnel started coming onboard. (February 1999)
Small line crew started laying pipe. (March 11, 1999)
Large line crew started laying pipe. (March 19, 1999)
Pipebursting started installation of pipe. (April 19, 1999)
Fully Operational in 6-month time frame.
Construction

(Siphon Construction)
Expansion/Upgrade Project - Bishop Road Interceptor

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Construction

Expansion/Upgrade Project - Bishop Road Interceptor (Completed)

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Construction

Setting trench box at NW 24th & Gore – 21” PVC pipe
for the 24th Street Upgrade
Construction

Directional boring used for air impact pipe bursting for the Arlington Avenue Project

Construction

Air impactor for the Arlington Avenue Project
12" HDPE pipe

Construction

Sub-Basin 316 - Pipebursting Winch
8" HDPE pipe
(NW 42nd & Lindy)
Construction

HDPE Pipe Fusion Equipment - Large Diameter Pipe (30” – 42”)

Installed in 6-weeks

(2400 L.F. of 30” HDPE)

Construction

HDPE Pipe Fusion Equipment - Large Diameter Pipe (30”)

Expansion/Upgrade - Large Line Pipelining (30’)

Construction
Construction

Directional Bore Equipment In Action

Sub-Basin 203 (pipe bursting)

Sheridan Road Upgrade Project – Phase I (open trench)
### Equipment ($3,000,000)

- ½ ton pickup 6
- 1 ton flat bed truck 5
- 6 wheel dump truck 3
- 10 wheel dump truck 6
- 60L Case trackhoe, 4WD, 3rd/4th 3
- LB75 New Holland, 4WD, 2nd/3rd 1
- 300 John Deere large trackhoe 1
- 100 John Deere mid size trackhoe 1
- 80 John Deere mini track hoe 1
- 24 John Deere front end loader 2
- John Deere skid steer loader 2
- McElroy Traction boli fusion welder 1
- Trimble GPS – RTK survey system 1
- Close Circuit TV inspection van 1
- Electro fusion machine (fusion fittings) 2
- Evanco tandem axle trailer 10 & 20 ton 4
- 1620 Directional bore machine 1
- 35 & 60Hp – 30” concrete saw 2
- Manhole form system 3 sets
- Manhole rehab machine 1
- Assorted trench shields and boxes 5
- 4” tile mounted pump 2
- 7, 9 & 16” pneumatic bursting hammer 1
- 6” pneumatic bursting hammer 1
- 7” pneumatic bursting hammer 1
- Pipes line laser 5
- 10 & 12 ton TT winch 2
- Tool trailer 4
- 700 cfm air compressor 1

### The City of Lawton

Challenges...
Challenges

- Increased Footage (~7,000 ft/yr)
- Purchasing
  - Strict Purchasing Procedures
  - Impacted Construction Scheduling
- Financing
  - Grants
  - OWRB Revolving Funds
  - Record Keeping/Accounting
  - Inflation of Materials

Challenges

- Rehabilitation Footage Variations
  - Maintaining projected footages
  - Equipment malfunctions
  - Additional footage
    - Unidentified defective lines exceed the 4,100 feet expected from SSES report
  - Phase I Footage Production (24,600 ft/year)

Phase I Challenges

Material Costs - Inflation

<table>
<thead>
<tr>
<th>Material</th>
<th>1999 Cost</th>
<th>Vendor</th>
<th>2005 Cost</th>
<th>Vendor</th>
<th>Difference/Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; PVC pipe</td>
<td>$1.65 per foot</td>
<td>Midstate Utility</td>
<td>$3.50 per foot</td>
<td>Oklahoma Contractors</td>
<td>$1.85, 112%</td>
</tr>
<tr>
<td>8&quot; Poly pipe</td>
<td>$2.77 per foot</td>
<td>Oklahoma Winwater</td>
<td>$4.77 per foot</td>
<td>Oklahoma Winwater</td>
<td>$2.00, 72%</td>
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<tr>
<td>1 1/2 crusher run</td>
<td>$3.25 per ton</td>
<td>Dolese</td>
<td>$5.25 per ton</td>
<td>Dolese</td>
<td>$2.00, 62%</td>
</tr>
<tr>
<td>#57 rock</td>
<td>$4.80 per ton</td>
<td>Dolese</td>
<td>$6.00 per ton</td>
<td>Dolese</td>
<td>$1.20, 25%</td>
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<tr>
<td>Concrete (cu yd)</td>
<td>$52.5 per cu yd</td>
<td>Southwest Ready Mix</td>
<td>$74 per cu yd</td>
<td>Southwest Ready Mix</td>
<td>$21.50, 41%</td>
</tr>
<tr>
<td>Rock Hauling</td>
<td>$1.95 per ton</td>
<td>Lawton Transit Mix</td>
<td>$4.50 per ton</td>
<td>Beall Trucking</td>
<td>$2.55, 131%</td>
</tr>
<tr>
<td>Diesel</td>
<td>$0.65 per gallon</td>
<td>Low Bid</td>
<td>$2.15 per gallon</td>
<td>Low Bid</td>
<td>$1.50, 230%</td>
</tr>
</tbody>
</table>

Budgeted Inflation Rate was 2.5% per year for total of 7.5% from start of program.
Actual CPI rate average was 3.82% per year for total of 27.72% from start of program.
Challenges

- Personnel/Staffing
  - Turnover
  - Skilled workers
  - Maintaining full crews
  - Employee motivation
  - Available work force

Challenges

- Weather
  - Bad Weather Days
- Utility Easements
  - Poorly Maintained by Property Owners
  - Encroachments
  - Buildings
  - Fences
- Utilities
  - SBC (SWBT)
  - CenterPoint Energy (ARKLA/Reliant Energy)
  - AEP (PSO)
  - CATV (Cablevision)
  - Waterlines

Easement Before...

Fields & Dunning Addition (between Oak and Maple)

Easement After...

Approximate Locations
Engineering/Construction Costs...

Accumulated Costs to Complete Phase I:

- Original In-House (1997-2005) $20,904,666.00
- Projected (1997/2005) $19,002,103.00
- Emergency Liner Project (04/05) $867,715.00

Savings over Contracted SSES Projections:

- Total Savings In-House $1,034,848.00
- Original Budgeted Savings $2,600,000.00

TOTAL SAVINGS PHASE I $3,634,848.00

Results...
SSO Reduction - Phase I

Results - Phase I

- Inflow/Infiltration (I&I) has been reduced and documented by flow monitoring of NuMu Creek Basin.
- Total I&I reduction of 40%, which exceeded our goal of 25 to 30%.

Contract Cost Comparison
Phase I
Lines Completed
214,000 L.F

Results
Rehabilitation Footages

Proposed Sewer Rehabilitation Footage Installation Schedule

<table>
<thead>
<tr>
<th>Phase 1 Footages by Year</th>
<th>SSES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consented Order</td>
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<tr>
<td>Pre-99</td>
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<td>1999</td>
<td>17,428</td>
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<td>2000</td>
<td>34,505</td>
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<td>2001</td>
<td>26,524</td>
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<td>2002</td>
<td>23,985</td>
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<td>2003</td>
<td>28,062</td>
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<tr>
<td>2004</td>
<td>26,362</td>
</tr>
<tr>
<td>2005</td>
<td>16,138</td>
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<tr>
<td>Total to date</td>
<td>151,513</td>
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</tbody>
</table>

**Includes 4,000 L.F. of maintenance identified lines (estimated at $375,000 per year)

Actual footage installed plus proposed installation will produce 214,080 Total Line Constructed In Phase 1.
**Private Service Inspections**

Private Service Inspection status, 2nd QTR, 2005

<table>
<thead>
<tr>
<th>Sub-System</th>
<th>Made</th>
<th>Defects Found</th>
<th>Defects Corrected</th>
<th>Non-Compliance</th>
<th>% Complete</th>
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<tbody>
<tr>
<td>Cache Creek Basin</td>
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<tr>
<td>Numu Creek Basin</td>
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<tr>
<td>Wolf Creek Basin</td>
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</tbody>
</table>

**The City of Lawton**

**Goals for Phase II**

- Remain ahead of DEQ required schedule
- Maintain a full staff for Sewer Construction crews
- Reduce turnover
- Train crew members in all aspects of sewer construction
- Improve the condition of the sewer collection system for the Citizens of Lawton
- Continue to provide cost savings to the Citizens of Lawton
Goals

- **Increased Production**
  - Production will increase 5,800 ft/year above SSES

- **Phase II Footage Total Production**
  - 30,400 ft/year

- **Phase II In-House Estimated Construction Cost**
  - $29 Million

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### Task Schedule – Phase II

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<tr>
<th>Task</th>
<th>Date</th>
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<tbody>
<tr>
<td>Complete Phase I Design</td>
<td>October 1, 2003</td>
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<tr>
<td>Begin Flow Monitoring Assessment Phase I</td>
<td>August 1, 2004</td>
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<tr>
<td>Begin Phase II Design</td>
<td>October 1, 2004</td>
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<tr>
<td>Complete Construction/Rehabilitation Phase I</td>
<td>July 1, 2005</td>
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<tr>
<td>Begin Construction/Rehabilitation Phase II</td>
<td>July 1, 2005</td>
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<tr>
<td>Complete Flow Monitoring Assessment Phase I</td>
<td>January 1, 2006</td>
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<tr>
<td>Award Proposal for Schedule for Phase II</td>
<td>January 1, 2011</td>
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<td>Complete Phase II Design</td>
<td>July 1, 2011</td>
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<tr>
<td>Begin Flow Monitoring Assessment Phase II</td>
<td>January 1, 2012</td>
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<tr>
<td>Complete Construction/Rehabilitation Phase II</td>
<td>July 1, 2012</td>
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<tr>
<td>Complete Flow Monitoring Assessment Phase II</td>
<td>January 1, 2013</td>
</tr>
</tbody>
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### Expansion/Upgrade Schedule – Phase II

[Diagram of phase II expansion/upgrade schedule]
Contacts

➢ Sewer Systems Technical Division, Public Works/Engineering
  2100 Southwest 6th Street
  (580) 581-3324

➢ Jerry Ihler, P.E. Public Works Director/City Engineer
➢ Rusty Whisenhunt, Assistant Director of Sewer Rehabilitation & Collections
➢ Roger L. Bridges, P.E. SSTD Civil Engineer

Questions?

End of Presentation